



CRS-170A

L-Band 1:1 Redundancy Switch Installation and Operation Manual

Accessory Product for use only with Comtech EF Data CDM-625A, CDM-625, CDM-850, CDM-840, CDM-760, CDM-750, CDM-570AL, CDM-570L, CDM-710GL, CDM-710, CDM-700, CDM-600L (CLM-9600L), and SDM-300L3 Modems (Modem Firmware and Hardware Requirements Apply)

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.



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Part Number MN/CRS170A.IOM / CD-CRS170A
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PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data CRS-170A L-Band 1:1 Redundancy Switch. This document is intended for anyone who installs or operates the CRS-170A.

Related Documents

- CDM-625A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A)
- CDM-625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625)
- CDM-850 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM850)
- CDM-840 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM840)
- CDM-760 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM760)
- CDM-750 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM750)
- CDM-570A/CDM-570AL/CDMR-570AL Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM570A)
- CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM)
- CDM-710G/710GL High-Speed Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM710G)

- CDM-710 Broadcast Satellite Modem Installation and Operation Manual
(CEFD P/N MN/CDM710.IOM)
- CDM-700 High-Speed Satellite Modem Installation and Operation Manual
(CEFD P/N MN/CDM700.IOM)
- CDM-600L Satellite Modem Installation and Operation Manual
(CEFD P/N MN/CDM600L.IOM)
- CLM-9600L Open Network Satellite Modem Installation and Operation Manual
(CEFD P/N MN/CLM9600L.IOM)
- SDM-300L3 Satellite Modem Installation and Operation Manual
(CEFD P/N MN/SDM300L3.IOM)
- CRS-150 1:1 Redundancy Switch Installation and Operation Manual
(CEFD P/N MN/CRS150.IOM)
- SMS-301 Redundancy Switch Installation and Operation Manual
(CEFD P/N MN/SMS301.IOM)

Conventions and References

Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at <http://patents.comtechefdata.com>.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

Warnings, Cautions and Notes



A **WARNING** INFORMS YOU ABOUT A POSSIBLE HAZARD THAT MAY CAUSE DEATH OR SERIOUS INJURY.



A **CAUTION** informs you about a possible hazard that MAY CAUSE INJURY or PROPERTY DAMAGE.

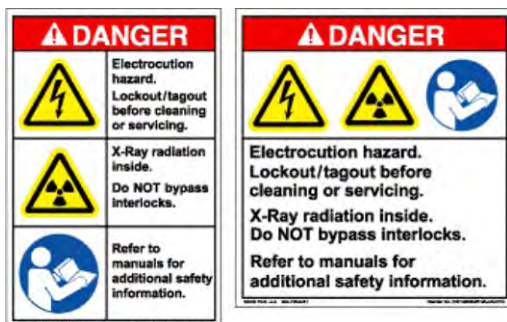


A **NOTE** gives you important information about a task or the equipment.



A **REFERENCE** directs you to additional information about a task or the equipment.

Examples of Multi-Hazard Notices



Recommended Standard Designations

The Electronic Industries Association (EIA) designations supersede the Recommended Standard (RS) designations. References to the old designations may be shown when depicting actual text (e.g., RS-232) displayed on Switch or the individual modem Web Server pages, serial remote interfaces, Telnet Command Line Interfaces (CLIs), or unit rear panels. All other references in the manual refer to EIA designations.



CAUTION – You should carefully review the following information.

Safety and Compliance

Electrical Safety and Compliance

The unit complies with the **EN 60950 Safety of Information Technology Equipment (Including Electrical Business Machines)** safety standard.

The equipment is rated for operation at ± 12 volts DC. It has a maximum power consumption of 4.5 Watts, and draws a maximum of 250 mA at +12 volts DC and 120 mA at -12 volts DC. The power supply current is, in all circumstances, supplied by either a single Comtech EF Data modem, or a pair of these modems.



CAUTION – IF THE UNIT IS OPERATED IN A VEHICLE OR MOVABLE INSTALLATION, MAKE SURE THE UNIT IS STABLE. OTHERWISE, EN 60950 SAFETY IS NOT GUARANTEED.

Electrical Installation



CAUTION – CONNECT THE UNIT TO A POWER SYSTEM THAT HAS SEPARATE GROUND, LINE AND NEUTRAL CONDUCTORS. DO NOT CONNECT THE UNIT WITHOUT A DIRECT CONNECTION TO GROUND.

Operating Environment



CAUTION – DO NOT OPERATE THE UNIT IN ANY OF THESE EXTREME OPERATING CONDITIONS:

- **AMBIENT TEMPERATURES LESS THAN 0° C (32° F) OR MORE THAN 50° C (122° F).**
- **PRECIPITATION, CONDENSATION, OR HUMID ATMOSPHERES OF MORE THAN 95% RELATIVE HUMIDITY.**
- **UNPRESSURIZED ALTITUDES OF MORE THAN 2000 METRES (6561.7 FEET).**
- **EXCESSIVE DUST.**
- **FLAMMABLE GASES.**
- **CORROSIVE OR EXPLOSIVE ATMOSPHERES.**

Equipment Connection



THE CRS-170A IS DESIGNED FOR OPERATION ONLY WITH THE COMTECH EF DATA PRODUCTS LISTED IN THIS MANUAL UNDER 'RELATED DOCUMENTS'. THESE PRODUCTS SUPPLY DC OPERATING CURRENT (ELECTRONICALLY FUSED AND PROTECTED) AND CONTROL SIGNALS FOR THE CORRECT FUNCTIONING OF THIS SWITCH. CONNECTION TO OTHER MANUFACTURERS' EQUIPMENT COULD RESULT IN DAMAGE TO THE SWITCH. THE CRS-170A IS NOT COMPATIBLE WITH OTHER COMTECH EF DATA MODEMS OR PRODUCTS NOT LISTED IN THIS MANUAL.

European Union Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive (1999/5/EC) and EN 301 489-1

Independent testing verifies that the unit complies with the European Union R&TTE Directive, its reference to EN 301 489-1 (*Electromagnetic compatibility and Radio spectrum **M**atters [ERM]; **E**lectro**M**agnetic Compatibility [EMC] standard for radio equipment and services, Part 1: Common technical requirements*), and the Declarations of Conformity for the applicable directives, standards, and practices that follow:

European Union Electromagnetic Compatibility (EMC) Directive (2004/108/EC)

- **Emissions: EN 55022 Class A** – Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.
- **Immunity: EN 55024** – Information Technology Equipment: Immunity Characteristics, Limits, and Methods of Measurement.

- **EN 61000-3-2** – Harmonic Currents Emission
- **EN 61000-3-3** – Voltage Fluctuations and Flicker.
- **Federal Communications Commission Federal Code of Regulation FCC Part 15, Subpart B.**



CAUTION – TO ENSURE THAT THE UNIT COMPLIES WITH THESE STANDARDS, OBEY THESE INSTRUCTIONS:

- Use coaxial cable that is of good quality for connections to the L-Band Type 'N' Rx (receive) female connector.
- Use Type 'D' connectors that have back-shells with continuous metallic shielding.
- Type 'D' cabling must have a continuous outer shield (either foil or braid, or both). The shield must be bonded to the back-shell.
- Operate the Switch and modems with their covers on at all times.

European Union Low Voltage Directive (LVD) (2006/95/EC)

Symbol	Description
<HAR>	Type of power cord required for use in the European Community.
	CAUTION: Double-pole/Neutral Fusing ACHTUNG: Zweipolige bzw. Neutralleiter-Sicherung

International Symbols			
Symbol	Definition	Symbol	Definition
	Alternating Current		Protective Earth
	Fuse		Chassis Ground



For additional symbols, see the Warnings, Cautions and Notes listed earlier in this Preface.

European Union RoHS Directive (2002/95/EC)

This unit satisfies (with exemptions) the requirements specified in the European Union Directive on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (EU RoHS, Directive 2002/95/EC).

European Union Telecommunications Terminal Equipment Directive (91/263/EEC)

In accordance with the European Union Telecommunications Terminal Equipment Directive 91/263/EEC, the unit should not be directly connected to the Public Telecommunications Network.

CE Mark

Comtech EF Data declares that the unit meets the necessary requirements for the CE Mark.

Product Support

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

Comtech EF Data Headquarters

<http://www.comtechefdata.com>

Comtech EF Data Corp.

2114 West 7th Street

Tempe, Arizona USA 85281

+1.480.333.2200

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner.

Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product. The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of

Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Chapter 1. INTRODUCTION

1.1 Overview



Figure 1-1. CRS-170A L-Band 1:1 Redundancy Switch Module

The CRS-170A L-Band 1:1 Redundancy Switch Module (**Figure 1-1**) is an L-Band Tx-Rx IF signal switch. It is designed for use with Comtech EF Data L-Band satellite modems in a 1:1 redundant (Online 'A' and Backup 'B') configuration.

The CRS-170A is compatible for use with the Comtech EF Data modem listed in **Table 1-1**. This table also summarizes the CRS-170A 1:1 IF Switch applications, including requirements for supporting data switching hardware and software.

The CRS-170A monitors the faults of the 'A' and 'B' modems and determines which modem should be online. The data switch is built into each terrestrial data interface inside both modems (excluding the CDM-600L [CLM-9600L] and SDM-300L3 modems, which require ancillary switching devices).

Table 1-1. CRS-170A Compatibility Summary

Modem	1:1 Data Switch	Firmware/Hardware Requirement ^{Note 3}
CDM-625A	Built into the CDM-625A	Firmware Ver. 1.1.1 or higher
CDM-625	Built into the CDM-625	Firmware Ver. 1.1.1 or higher
CDM-850	Built into the CDM-850	Firmware Ver. 1.7.1.X or higher
CDM-840	Built into the CDM-840	Firmware Ver. 1.2.4 or higher
CDM-760	Built into the CDM-760	Firmware Ver. 1.1.1 or higher
CDM-750	Built into the CDM-750	Firmware Ver. 1.1.1 or higher
CDM-570AL	Built into the CDM-570AL	Firmware Ver. 1.1.1 or higher
CDM-570AL w/Optional IP Packet Processor	User-provided hub or Layer 2 switch	Firmware Ver. 1.2.1 or higher
CDM-570L	Built into the CDM-570L	Firmware Ver. 1.6.7 or higher
CDM-570L 2/optional IP Module	User-provided hub or Layer 2 switch	Firmware Ver. 1.5.4.2 or higher
CDM-710GL	Built into the CDM-710GL	Firmware Ver. 5.1.1 or higher
CDM-710 (L-Band version)	Built into the CDM-710	Firmware Ver. 2.4.1 or higher; Chassis Rev. A or higher
CDM-700 (L-Band version)	Built into the CDM-700	Firmware Ver. 1.1.6 or higher; Chassis Rev. A or higher
CDM-600L (CLM-9600L)	CRS-150 ^{Note 1}	Firmware Ver. 1.1.4 or higher; Hardware Rev. 3 or higher
SDM-300L3	SMS-301 ^{Note 1}	Special version of SMS-301

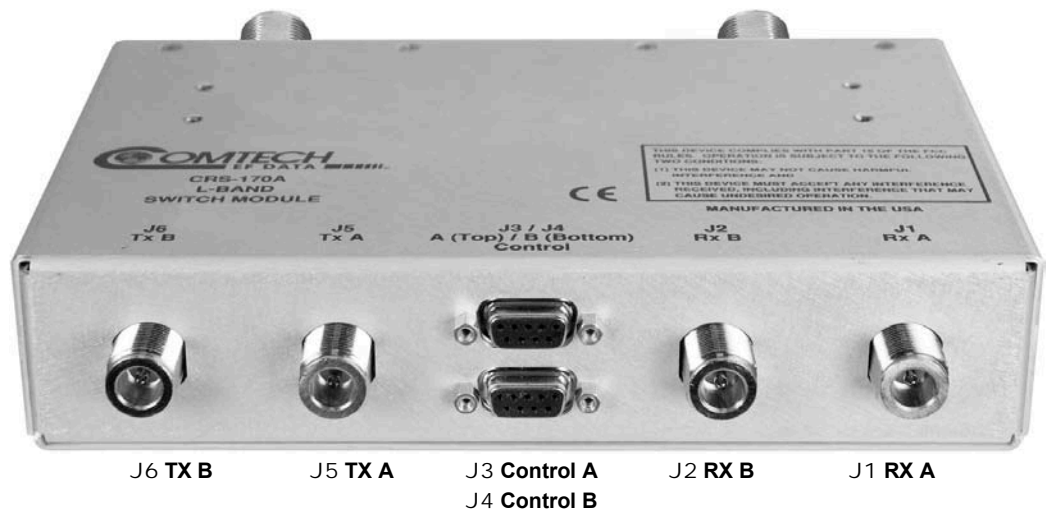


- 1) See Sect. 1.3.3 for CRS-170A ► Modem ► Ancillary Switch interoperation information. For detailed information about the CRS-150 and SMS-301 switches, see their respective Installation and Operation Manuals:
 - CRS-150 1:1 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/CRS150.IOM)
 - SMS-301 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/SMS301.IOM)
- 2) This switch and its paired modems use Type 'N' connectors for L-Band operation.
- 3) Firmware updates are free and may be downloaded from the Comtech EF Data web site (www.comtechefdata.com). If a modem does not meet the hardware requirements, contact Comtech EF Data Product Support – hardware revision upgrades must be performed at CEFD.

1.2 Physical Features

1.2.1 Modem Side Features

Figure 1-2 shows the modem side of the CRS-170A. The connectors provided here facilitate all necessary external connections between the CRS-170A and the compatible Comtech EF Data modems.

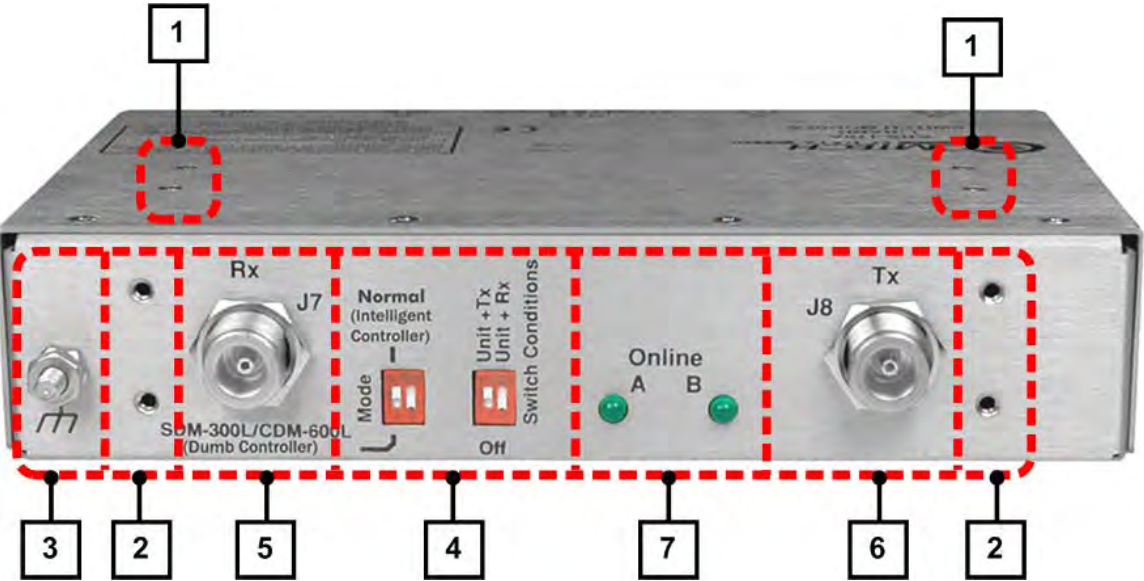


Ref Des	Name	Connector Type	Function	Chapter Sect.
J1	Rx A	Type 'N'	Input to Modem 'A'	3.2.1.1
J2	Rx B	Type 'N'	Input to Modem 'B'	3.2.1.1
J3	Control A	DB-9F 9-pin Type 'D' female	Modem 'A' Control Interface	3.2.1.2
J4	Control B	DB-9F 9-pin Type 'D' female	Modem 'B' Control Interface	3.2.1.3
J5	Tx A	Type 'N'	Output from Modem 'A'	3.2.1.1
J6	Tx B	Type 'N'	Output from Modem 'B'	3.2.1.1

Figure 1-2. CRS-170A – Modem Side Connectors

1.2.2 Top and Antenna Side Features

Figure 1-3 shows the CRS-170A top and antenna side features and the chapters that provide more detailed information.



Feature	Description	Chapter Sect.
1	4X #6-32 holes for vertical rack mounting (used with Switch Mounting Kit KT/11708)	2.2
2	4X #6-32 holes for horizontal rack mounting (used with Switch Mounting Kit KT/11708)	2.2
3	Ground Stud	2.2, 3.2.2.2
4	"Switch Conditions" DIP Switches	1.3.1, 4.9
5	J7 Rx Type 'N' Input Connector	3.2.2.1
6	J8 Tx Type 'N' Output Connector	3.2.2.1
7	Online LED Indicators	1.3.1

Figure 1-3. CRS-170A – Top and Antenna Side Features

1.3 Functional Description

The CRS-170A performs the Tx and Rx coaxial switching required for redundant modem operation with an outdoor BUC and LNB.

The Tx (transmit) side switches four modem output signals that are multiplexed onto the transmit coaxial cable:

- 950-2250 MHz L-band transmit RF;
- 10 MHz BUC frequency reference;
- 600 KHz BUC FSK control and status communication;
- BUC DC power supply.

The Rx (receive) side of the switch uses both power dividers and relays to provide the redundant modem interface for three signals multiplexed onto the LNB coaxial cable:

- 950-2250 MHz L-band receive RF from LNB;
- 10 MHz frequency reference to LNB;
- DC power supply to LNB.

1.3.1 Switch / Modem Operation

The CRS-170A is configured with two modems to form a complete 1:1 redundant modem system. Within the CRS-170A, a redundancy controller continually monitors the status of faults for both modems to determine which modem should be Online and Offline. The control cables between the modems and the CRS-170A include four signal groups:

- **First**, serial full-duplex communication lines are routed from one modem to the other modem via the CRS-170A. Using these lines, this Online unit can interrogate the Offline unit at regular intervals to determine its configuration. If a difference in configuration is detected, the Online unit will reconfigure the Offline unit so that the configurations are always synchronized. This process is *entirely automatic* – if the Offline unit is replaced, it does not have to be manually reprogrammed to match the Online unit.
- **Second**, the Modem's Unit, Tx and Rx faults signals from both modems are routed to the CRS-170A. This allows the redundancy controller to always know the health status of both modems.
- **Third**, the online/offline signals are routed from the CRS-170A to each modem. Based on the modem faults, the CRS-170A will determine which modem should be Online and Offline. In the event that both modems indicate faults through some malfunction, the CRS-170A switch will select, by default, **Modem 'A'**.

- **Fourth**, +12V is routed from each modem to the CRS-170A for operational power. This power from both modems is diode OR'd so that the switch remains active if power is lost from one of the modems.

Mode Switches – The Mode DIP switches, located on the antenna side of the CRS-170A, allow the switch to operate in two different modes: **Normal (Intelligent Controller)** Mode and **SDM-300L/CDM-600L (Dumb Controller)** Mode.

- Use **Normal (Intelligent Controller)** Mode for CDM-625/A, CDM-850, CDM-840, CDM-760, CDM-750, CDM-710GL, CDM-710, CDM-700, and CDM570L/AL modems.
- Use **SDM-300L/CDM-600L (Dumb Controller)** Mode for SDM-300L and CDM-600L (CLM-9600L) modems.



IF Switching – The CRS-170A provides L-Band redundancy, but when switching occurs, it accommodates more than just the L-Band signals:

- **On the Tx side**, it switches the Tx L-Band signal, the 10 MHz reference to the BUC, DC power to the BUC and, on CDM-570L modems, FSK signaling to the BUC.
- **On the Rx side**, it switches the 10 MHz reference to the LNB, and DC power to the LNB. The Rx L-Band signal from the LNB is split in a power divider to continuously drive both the Online and Offline demodulator. The Offline demodulator can then maintain lock so that it is ready to quickly assume Online status for receive traffic when a switchover is required.

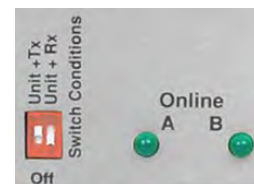
Data Switching is accomplished inside each modem, in the data interface itself. A 'Y' cable connects both the Online unit and the Offline unit to the terrestrial data source. Transmit data drives both modems in parallel so that the Backup modulator is always ready to come Online. Termination impedance for the modem line receivers is active in the Online unit. On the Rx side of the interface, TRI-STATE® control of the Offline unit line drivers keeps the Offline unit from interfering with the Rx data traffic. Send timing output from the Offline unit is also TRI-STATE®¹.



The Offline Modem holds its Rx terrestrial data in TRI-STATE® as commanded by the CRS-170A Switch. Because of this, it is very important to power down the Offline Modem before disconnecting the modem from the Switch.

Manual Switching is user-enabled locally via the Online unit; locally using the modem's front panel, or remotely using serial remote control or the modem's Web Server (HTTP) Interface.

You must control Automatic Switching Selection via the Online unit. Use the CRS-170A **Switch Conditions Unit+Tx** and **Unit+Rx** DIP switches, located on the antenna side of the CRS-170A, to configure the conditions that cause an automatic switchover. These settings provide a great deal of flexibility in the operation of the switch: you can select between



¹ TRI-STATE is a registered trademark of National Semiconductor.

Modem Unit faults only; Modem Unit faults or Receive Traffic faults; Modem Unit faults or Transmit Traffic faults; or all three.



Sect. 4.9 Configure Switch DIP Settings

Two green LEDs are located on the antenna side of the CRS-170A. They provide a visual identifier for the Online unit.

With the ‘bridging’ architecture of the CRS-170A (whereby identical terrestrial data traffic signals are routed to both Online and Offline units), the redundancy controller can avoid unnecessary switchovers. By examining the fault status of both modems, it can infer if the fault is external to the system. For example, you have configured the CRS-170A to switch following Unit Faults or Transmit Traffic Faults, and your modems have been configured for external clock operation. Now, suppose that the external equipment (network, multiplex, router, etc.) fails – both the Offline and Online units will now show a Transmit Traffic fault (No Clock Detected from Terrestrial Port). The CRS-170A Controller State Machine will see that both faults have occurred at the same time (i.e., within a 0.5 second window), and infers that the fault is external. Therefore, no unnecessary switchover is initiated.

1.3.2 1:1 IP Redundancy Data Switching

1.3.2.1 CDM-625/A, -850, -840, -760, -750, -710GL, -710, -700 Managed Switch Mode

A standard, user-provided Ethernet Layer 2 Switch is needed when a CDM-625/A, -850, -840, -760, -750, -710GL, -710, or -700 modem is configured for Managed Switch Mode (also known as “Ethernet Bridge Mode”) terrestrial traffic.

A Layer 2 Switch is designed to limit the traffic that egresses each port by only sending Ethernet packets out the port that the destination network device is located. The switch maintains a table - known as the dynamic Content-Addressable Memory (CAM) table - that maps MAC addresses to switch ports. When a packet arrives, in which an entry for that specific destination MAC is unknown to the switch, it sends the packet out all ports and waits for response packets in an attempt to identify which port that particular MAC resides. Once the device responds, the switch is able to map the MAC to the port in the CAM table.

Any new arriving packets destined for that MAC address will be forwarded only out the port identified in the CAM table. Most switch CAM tables do have a flush or timeout value, but is normally set to a very high number to limit the amount of times the switch has to broadcast a packet out all ports. It is also important to note that CAM entries for a specific port are cleared when a port link goes down.

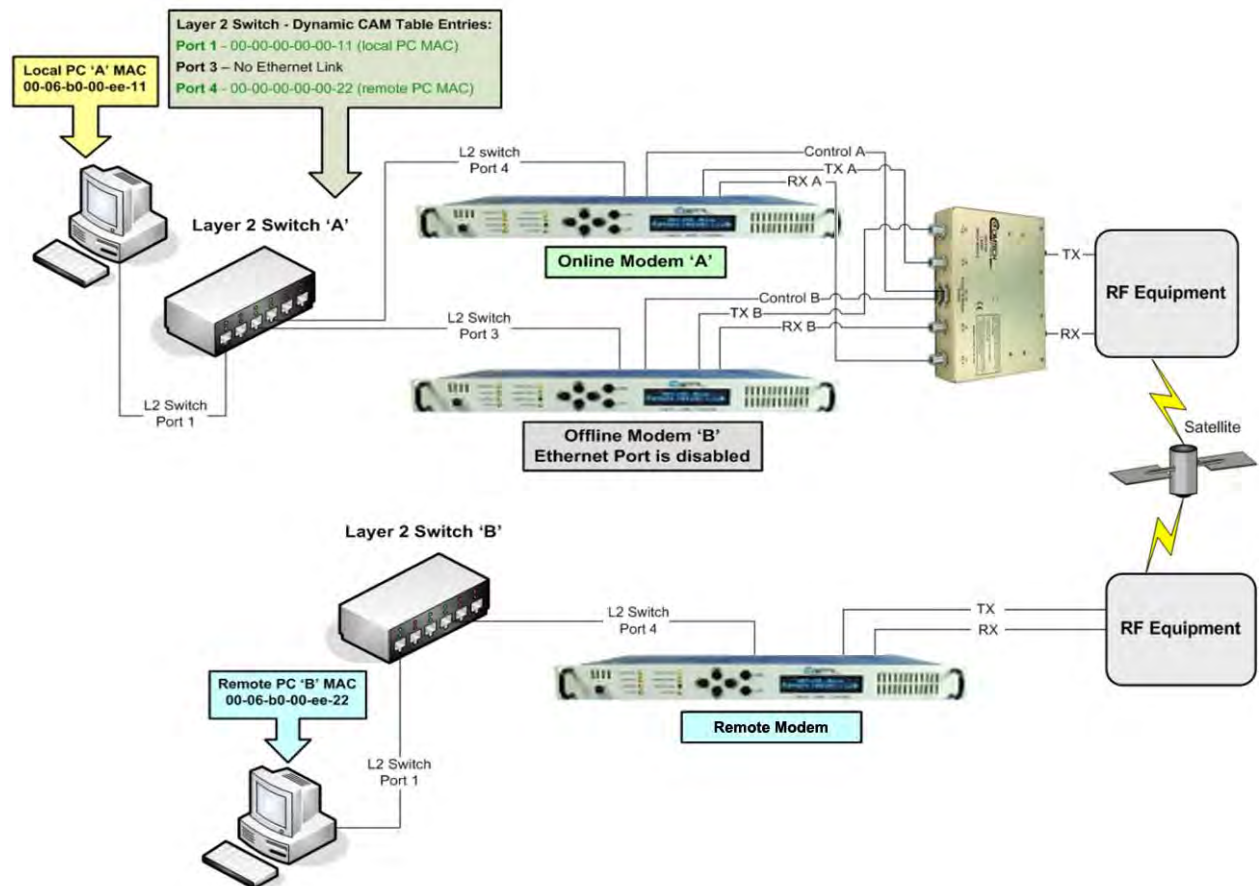


Figure 1-4. CDM-625/A, -850, -840, -760, -750, -710GL, -710, or -700 1:1 IP Redundancy Managed Switch Mode

Figure 1-4 shows a Managed Switch Mode 1:1 IP Redundancy setup with the Ethernet data interface of both modems connected to a Layer 2 Switch. Both modems are operational – Modem ‘A’ is Online and connected to Port 4 of the Layer 2 Switch. Modem ‘B’ is Offline and connected to Port 3 of the Layer 2 Switch, but the Ethernet link is not active because only the Online unit will have an active Ethernet data interface. Also, Local PC ‘A’ is connected to Port 1 of the Layer 2 Switch.

When Ethernet traffic is sent from Local PC ‘A’ across the satellite link to remote PC ‘B’, the Layer 2 Switch will “learn” the MAC addresses of both PCs and will have these dynamic entries in its CAM Table:

- Port 1** MAC 00-00-00-00-00-11 (Local PC ‘A’)
- Port 3** No entries, port down
- Port 4** MAC 00-00-00-00-00-22 (Remote PC ‘B’)

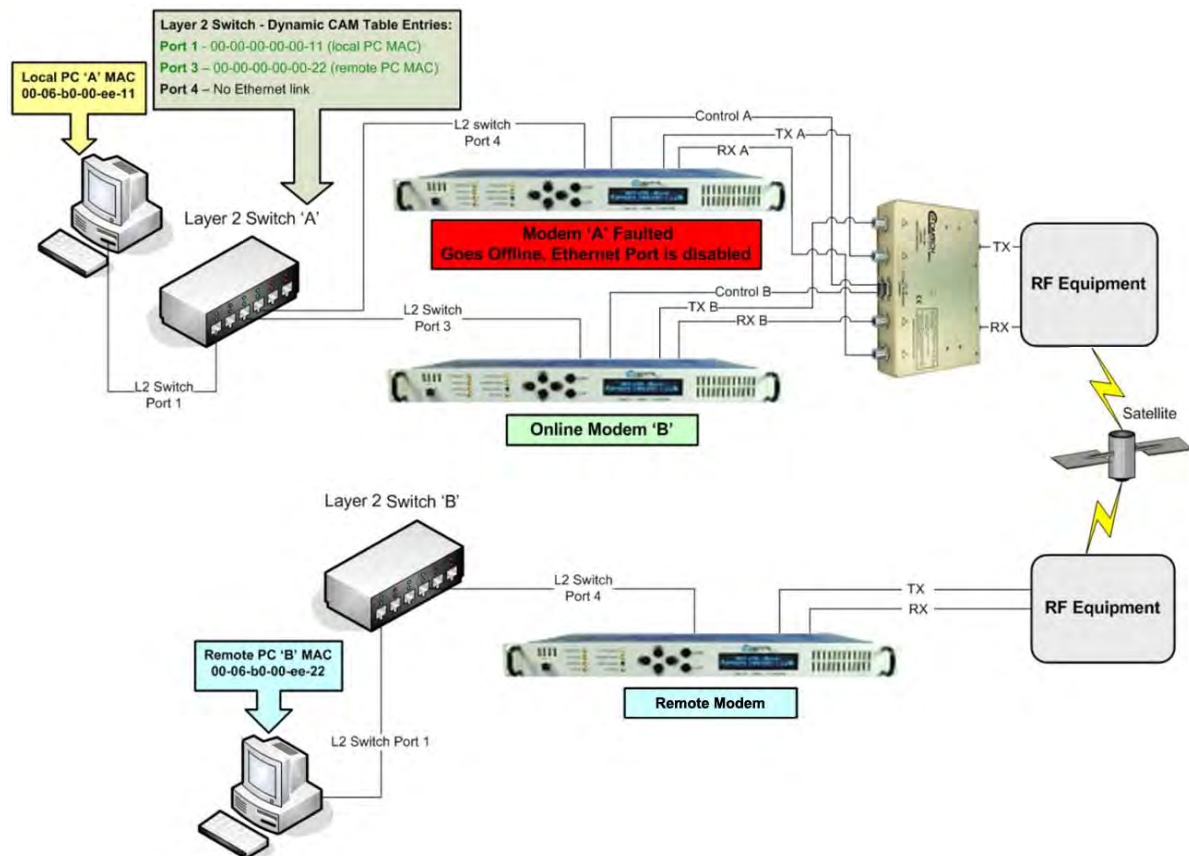


Figure 1-5. CDM-625/A, -850, -840, -760, -750, -710GL, -710, -700 1:1 IP Redundancy Managed Switch Mode – Switchover

As shown in **Figure 1-5**, in the event of a fault on the **Online unit 'A'**, the following will occur:

- Modem 'A' goes *offline* and disables its Ethernet data interface.
- Simultaneously, Modem 'B' goes *online* and enables its Ethernet data interface.
- Layer 2 Switch 'A' senses that Port 4 is no longer active and clears the CAM table entries for that port.
- When the next Ethernet packet from Local PC 'A' destined for Remote PC 'B' arrives at Switch 'A', there is no CAM entry for the PC 'B' MAC, so it will be broadcast to all active ports.
- When the next Ethernet packet from Remote PC 'B' arrives at Switch 'A', Switch 'A' dynamically adds the PC 'B' MAC to the CAM table for Port 3.

Note the following:

- 1) The Managed Switch Mode method of redundancy is intended to be equivalent to pulling the Ethernet cable from one port and putting it into a different port on the same switch.

- 2) **For CDM-625/A modems:** You may configure one of the CDM-625/A's four available 10/100 Ethernet ports for M&C Ethernet. As configured in **Dedicated Management Port Mode**, when the modem is offline the *M&C-designated port* remains functional and available for operation, while the three remaining ports are unavailable. Otherwise, if *none* of the 10/100 Ethernet ports are reserved for M&C operation; *all four ports* become unavailable when the modem is offline.



This configuration must be enabled on both modems.

See the **CDM-625** or **CDM-625A Advanced Satellite Modem Installation and Operation Manual** for instructions to configure one of the four 10/100 Ethernet ports for each modem for remote Ethernet M&C.



Dedicated Management Port Mode is not configurable for use when the optional IP Packet Processor is installed and enabled. With the IP Packet Processor enabled, as a means to avoid Ethernet Networking Loops, only one of the CDM-625/A's four 10/100 Ethernet Ports is used for each modem at any given time.

- 3) **For CDM-760, -750, -710GL, -710, or -700 modems:** When the modem is offline, although all GigE port(s) are unavailable, the M&C Ethernet port remains functional and available for operation.
- 4) Installation must use a true switching device, not a hub device.

1.3.2.2 CDM-625/A (with Optional IP Packet Processor) – Router Mode



All configuration changes can only be made to the Online unit and will require you to “Save Parameters to permanent storage” to ensure the configuration change is also applied to the Backup Modem.

For the CDM-625/A with the optional IP Packet Processor **installed** and **enabled** and the configuration set for Router Mode, you need to provide an external Ethernet switch.

In Router Mode, both modems must be assigned a unique Management IP address on the same subnet (172.18.10.21/24 and 172.18.10.22/24 as shown in **Figure 1-6** and **Figure 1-7**). This is used to share the parameters file. A Traffic IP address on the subnet must also be assigned (172.18.10.20/24) in the Online unit.



The Traffic IP Address must be different from either Management IP Address.

Whichever modem is Online will assume the Traffic IP. When there is a switchover to the backup modem, this modem will now assume the Traffic IP.

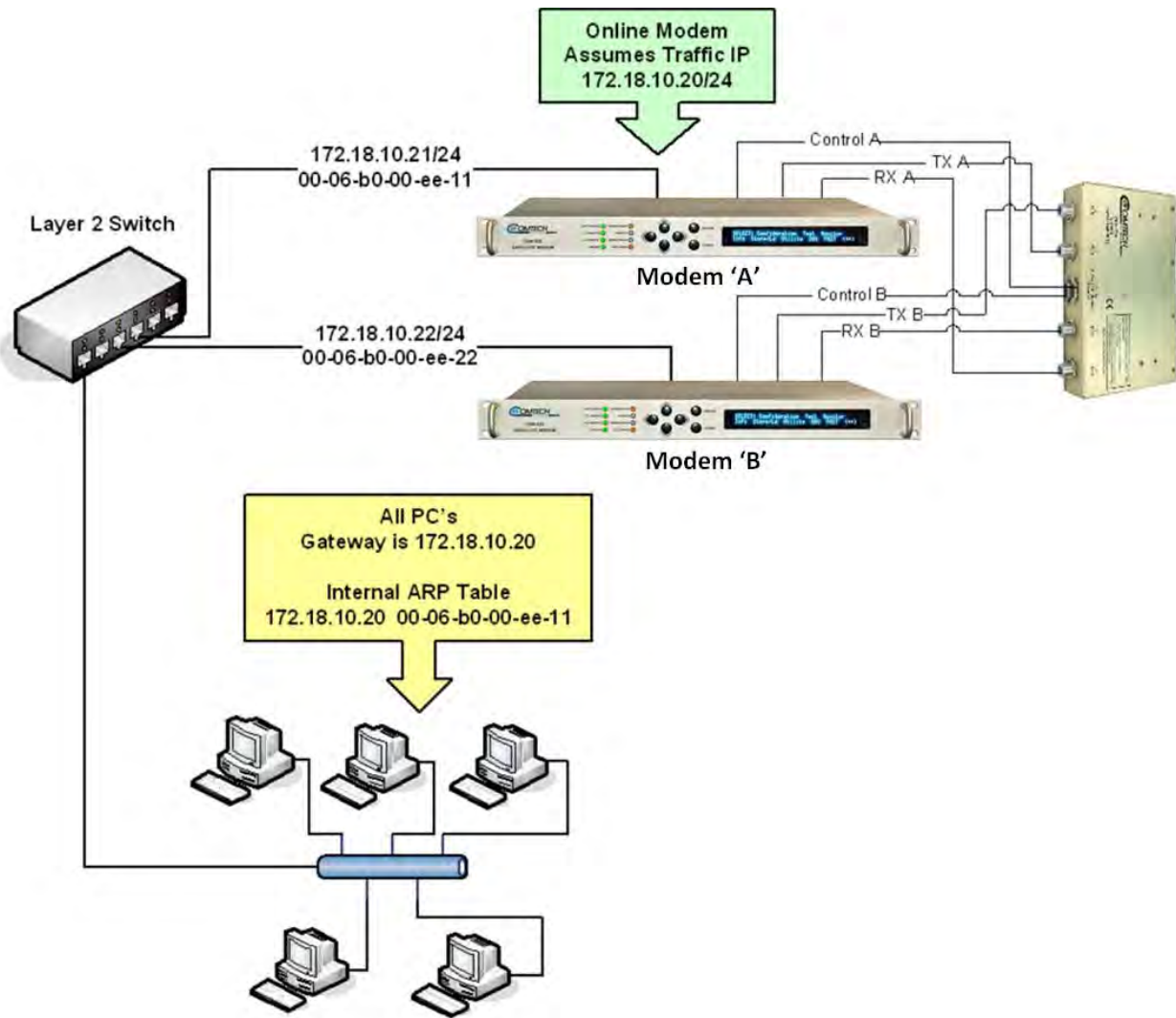


Figure 1-6. CDM-625/A 1:1 IP Redundancy Router Mode – 'A' Online

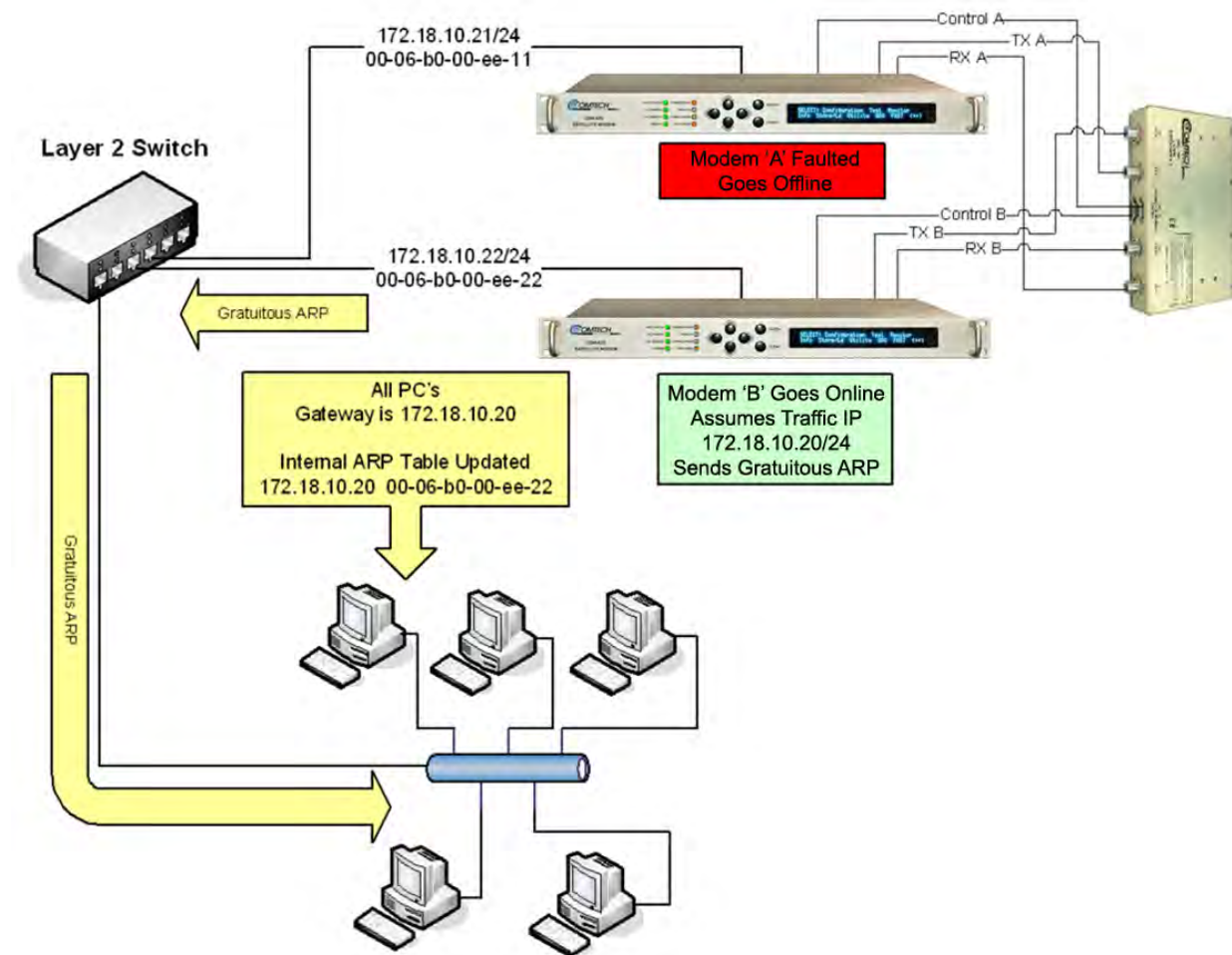


Figure 1-7. CDM-625/A 1:1 IP Redundancy Router Mode – Switchover ('B' Online)

Per **Figure 1-7**, the backup modem will also broadcast a "gratuitous ARP" which will tell all local devices to now associate a new MAC address for the Traffic IP 172.18.10.20. Each device will update their ARP tables and traffic will resume virtually instantaneously.

1.3.2.3 CDM-570L/AL with optional IP Module or Packet Processor – Managed Switch or Router Modes



- Do not use the M&C Ethernet port (bottom RJ-45 connector) when the optional IP Module is installed.
- All configuration changes can only be made to the Online unit and will require you to “Save Parameters to permanent storage” to ensure the configuration change is also applied to the Backup Modem.

Managed Switch (Ethernet Bridge) Mode: For the CDM-570L/AL in Managed Switch Mode (also known as “Ethernet Bridge Mode”) you MUST use an external Ethernet hub to insure that traffic will continue after a switchover. If an Ethernet switch is used, there could be a several minute outage while the Ethernet Switch “re-learns” the correct output Ethernet port. Using a “dumb” Ethernet hub allows LAN-to-WAN traffic to continue even after a switchover occurs since both modems will be receiving the LAN traffic.

In Managed Switch Mode, both modems should be assigned a unique Management IP address on the same subnet in order to share the parameter file.

Router Mode: For the CDM-570L/AL in Router Mode, you should use an external Ethernet switch. Router mode does not require a “dumb” hub as with Managed Switch Mode and, for performance reasons, an Ethernet switch is highly recommended.

In Router Mode, both modems must be assigned a unique Management IP address on the same subnet (172.18.10.21/24 and 172.18.10.22/24 as shown in **Figure 1-8** and **Figure 1-9**). This is used to share the parameters file. A Traffic IP address on the subnet must also be assigned (172.18.10.20/24) in the *Online unit*.

Whichever modem is Online will assume the Traffic IP. When there is a switchover to the backup modem, this modem will now assume the Traffic IP. As shown in **Figure 1-9**, the backup modem will also broadcast a “gratuitous ARP” that will tell all local devices to now associate a new MAC address for the Traffic IP 172.18.10.20. Each device will update their ARP tables and traffic will resume virtually instantaneously.

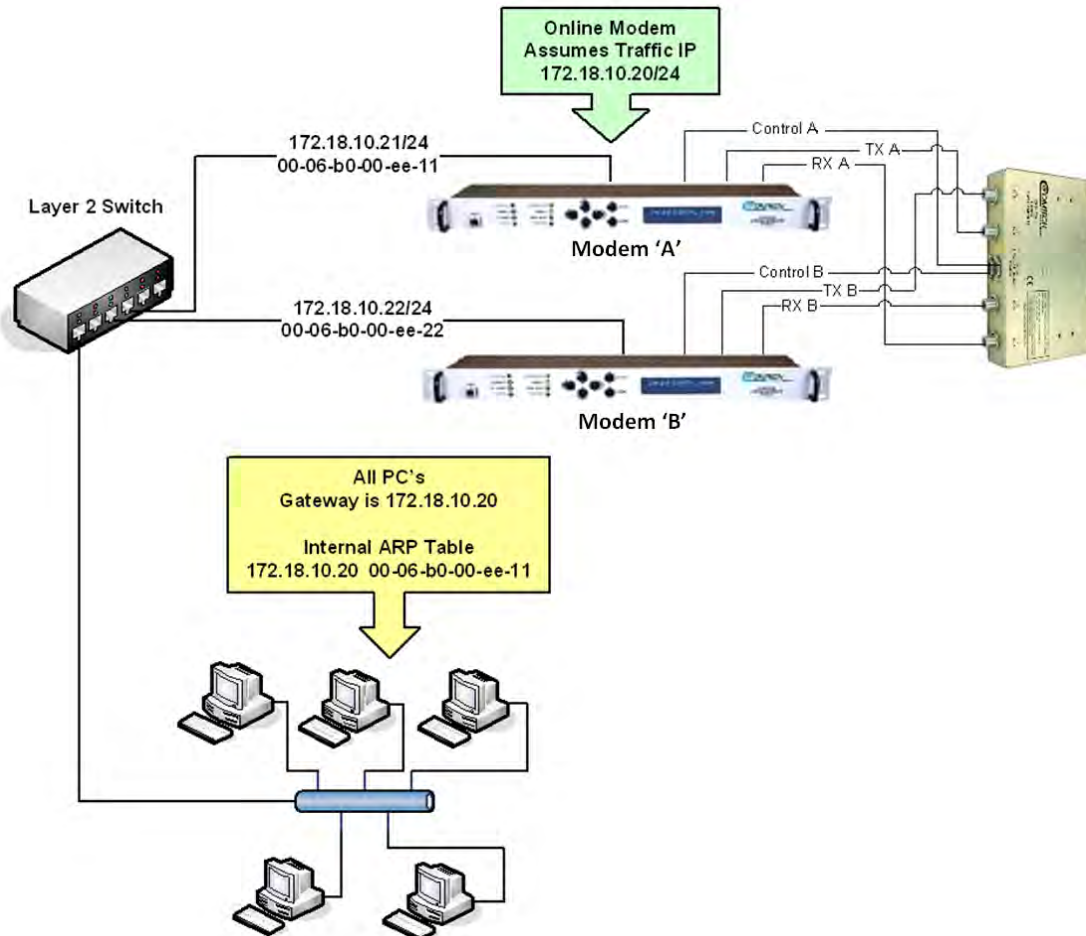


Figure 1-8. CDM-570L/AL 1:1 IP Redundancy Router Mode – 'A' Online

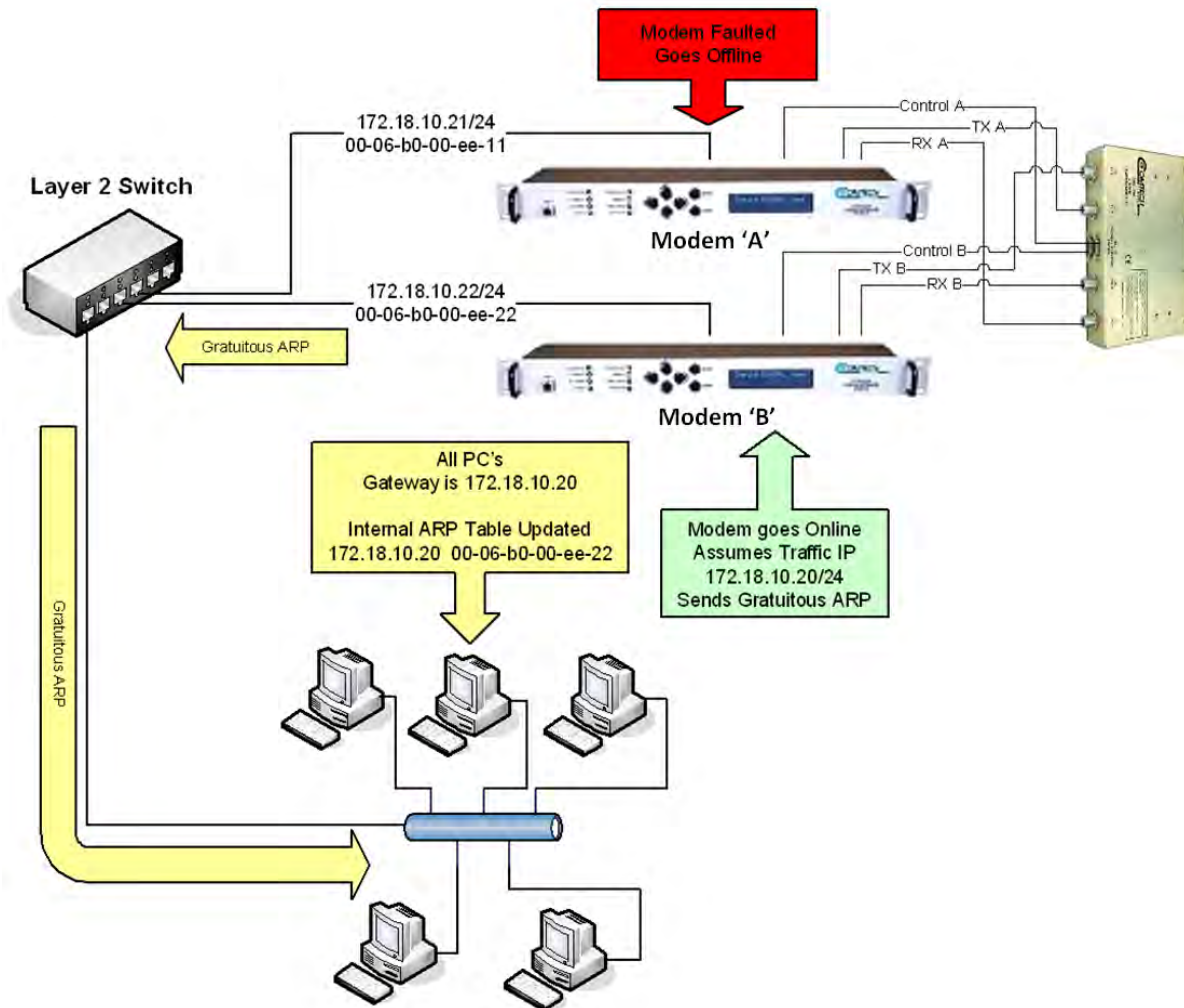


Figure 1-9. CDM-570L/AL 1:1 IP Redundancy Router Mode – Switchover ('B' Online)

1.3.3 CRS-170A Operation with CDM-600L (CLM-9600L) and SDM-300L3 Modems

The CDM-600L (CLM-9600L) and SDM-300L3 modems do not have built-in switching capability for the terrestrial data side of the link:

- For the CDM-600L (CLM-9600L), 1:1 redundancy requires both a CRS-150 switch to act as controller and terrestrial data switch and a CRS-170A to perform the L-Band switching. The CRS-170A is required because the CRS-150 RF switching is limited to the L-Band band, and will not handle the high current BUC power supply multiplexed onto the transmit coaxial cable.
- Similarly, the SDM-300L3 requires an SMS-301 switch together with the CRS-170A.

In both cases, the CRS-170A is controlled by the supporting data switch, and places the 'A' or 'B' modem RF Online to match the data switch state. The CDM-600L (CLM-9600L) modems supply

redundant power to the CRS-170A through the CRS-150. The SMS-301 itself has redundant power supplies, and feeds power to the CRS-170A through the control cable. Online/Backup Modem configuration matching is provided by the CRS-150 controller communication with the CDM-600L (CLM-9600L) modem. The SMS-301 does not automatically configure the Backup Modem.

Operation with two CDM-600L (CLM-9600L) modems requires an additional CRS-150 1:1 switch for terrestrial data switching and 1:1 control, while operation with two SDM-300L3 modems requires an additional SMS-301 1:1 switch to handle terrestrial data and control. Thus, there are three functional configurations for the CRS-170A.

1.3.3.1 Operation with CDM-600L (CLM-9600L) Modems and CRS-150 Switch



CRS-150 1:1 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/CRS150.IOM)



THE CRS-150 IS AN ACCESSORY PRODUCT DESIGNED SPECIFICALLY FOR THE COMTECH EF DATA CDM-600 AND CDM-600L (CLM-9600L) MODEMS, AND MUST NOT BE USED WITH ANY OTHER EQUIPMENT.

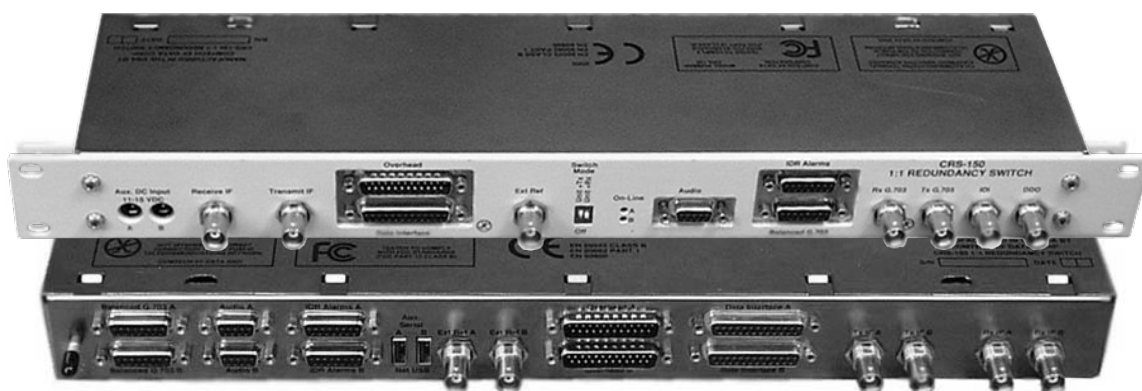


Figure 1-10. CRS-150 1:1 Redundancy Switch

The CRS-150 1:1 Redundancy Switch (**Figure 1-10**) connects to Online and Backup modems, monitors the fault status of these units, and controls the routing of data to and from the units. IF signals, 10MHz reference signals, DC power for the BUC and LNB, and FSK signaling to the BUC are switched in the CRS-170A under control of the CRS-150. In the case of an equipment failure, automatic switching takes place to protect the traffic circuit.

At the heart of the CRS-150 is a Controller State Machine that is responsible for fault monitoring and control of switching functions – it is implemented in a Complex Programmable Logic Device (CPLD).

The CRS-150 derives its operating power from the Online and Backup modems via extra power-carrying wires in the data cable from each modem. Similarly, the CRS-170A derives its +12V power from both modems through 'Y' cable connection to the same cables. The required online and offline control signals are also included in these cables. A diode sharing arrangement with a

current sharing circuit ensures that power is taken equally from the two modems in normal operation.

In the event that one of the two units is removed, however, the remaining modem can supply all current requirements. The modems supply +12 volts DC (at a combined total of 400 mA max) and -12 volts DC (at a combined total of 120 mA max). Maximum power consumption occurs in a serial LVDS mode at maximum data rate (20 Mbps). Power consumption in EIA-232 modes is approximately 40% of the maximum values. The modem employs electronic fuses that prevent excessive current from being drawn by the CRS-150 should an anomalous condition occur.

Transmit Clock and Data signals entering the CRS-150 via the Data Interface are buffered and fed to both modems simultaneously; this parallel feed ensures that the Backup unit sees the same traffic conditions as the Online unit. Rx Data and Clock signals coming from the Online unit are routed through signal relays to the Data Interface. In the event that a switchover occurs, these relays switch so the Backup unit then supplies the Data and Clock signals.

As only one modem in the pair (the Online unit) is permitted to transmit its IF carrier signal at any one instant, the Backup unit is forced to disable its Tx carrier by asserting the Tx Carrier Off signal at the Data Interface. Additionally, the CRS-170A provides further isolation and security by using an RF relay within the unit.

The Rx IF signal is fed to both modems simultaneously through the power divider in the CRS-170A. This divider introduces a loss of approximately 3.5 dB but, given the wide dynamic range of the demodulator in the CDM-600L (CLM-9600L), this is not considered to be a problem. The advantage of this scheme is that the demodulators in both Online and Backup units are locked, and therefore if a switchover does occur, there will be no delay while waiting for the demodulator to acquire lock.

Fault status information is fed from the Online and Backup modems via the Data Interface connector. Based on the fault status, the Controller State Machine in the CRS-150 decides whether the 'A' or 'B' unit is to be the Online unit. It asserts a control signal to the Backup unit, which mutes its Tx IF carrier and simultaneously indicates to the microcontroller within the Backup unit that the unit is no longer 'Online'. Consequently, the 'Online' LED on the front panel of the Backup Modem is extinguished and the Backup status is also reported over the remote control bus so an external M&C system can determine the state of the redundancy system. At the same time, a green LED will illuminate on the front of the CRS-150 to indicate whether the 'A' or 'B' unit is Online, and the green LEDs on the antenna side of the CRS-170A will indicate the same status.

Set the DIP switches on the CRS-170A antenna side to establish modem-specific operation. For the CDM-600L (CLM-9600L), place the Mode switch in the **SDM-300L/CDM-600L (Dumb Controller)** position and push the **Switch Condition** switches to the **OFF** position.



Sect. 4.9 Configure Switch DIP Settings

1.3.3.2 Operation with SDM-300L3 Modems and SMS-301 Switch



SMS-301 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/SMS301.IOM)



Figure 1-11. Comtech EF Data SMS-301 1:1 Redundancy Switch

The SMS-301 1:1 Redundancy Switch (**Figure 1-11**) is modified from the standard version that operates with 70/140 MHz IF SDM-300A modems. All operation as a 70/140 MHz modem switch applies except that the RF switching is done in the CRS-170A. The BNC IF connectors are replaced by Type 'N' connectors, as BNC connectors and internal switching are not suitable for L-Band operation. Signals on the 'J14 | Status/Faults' connector are modified to provide +12VDC power output and A/B switch control outputs to the CRS-170A. The SMS-301 has its own redundant power supplies, so the CRS-170A receives redundant power.

Operation here is similar to operation of the CRS-150 1:1 Redundancy Switch with CDM-600L (CLM-9600L) Online and Backup modems. The SMS-301 operates as the principal switch and controller, with the CRS-170A providing the required switching for L-Band signals, references, and power supplies that the SMS-301 cannot handle.

The SMS-301 connects to the Online and Backup SDM-300L3 modems, monitors the fault status of these two units, and controls the routing of data to and from the units. IF signals, 10MHz reference signals, DC power for the BUC and LNB, and FSK signaling to the BUC are switched in the CRS-170A under control of the SMS-301. In the case of equipment failure, automatic switching takes place to protect the traffic circuit.

Set the DIP switches on the CRS-170A antenna side to establish modem-specific operation. For the SDM-300L3, place the Mode switch in the **SDM-300L/CDM-600L (Dumb Controller)** position and push the Switch Condition switches to the **OFF** position.



Sect. 4.9 Configure Switch DIP Settings

1.4 Summary of Specifications

Equipment Type	L-Band 1:1 Redundancy Switch
Manufacturer	Comtech EF Data, Tempe, Arizona
Supported Comtech EF Data Modems	<ul style="list-style-type: none"> • CDM-625A Advanced Satellite Modem with/without optional IP Packet Processor • CDM-625 Advanced Satellite Modem with/without optional IP Packet Processor • CDM-850 Remote Router • CDM-840 Remote Router • CDM-760 Advanced High-Speed Trunking Modem • CDM-750 Advanced High-Speed Trunking Modem • CDM-570AL L-Band Satellite Modem with/without optional IP Packet Processor • CDM-570L L-Band Satellite Modem with/without optional IP Module • CDM-710GL L-Band High-Speed Satellite Modem • CDM-710 L-Band Broadcast Satellite Modem • CDM-700 L-Band Satellite Modem • CDM-600L (CLM-9600L) with CRS-150 1:1 Data Switch • SDM-300L3 with SMS-301 1:1 Data Switch
Operating Modes	<ul style="list-style-type: none"> • Fully automatic under control of supporting 1:1 switch. • Manual under control of supporting 1:1 switch.
Architecture	<ul style="list-style-type: none"> • Full bridging architecture when supported by CRS-150, or SMS-301 data switching and control, with configuration synchronization. • Tx redundancy supports all BUC interface signals (RF, 10 MHz reference, FSK communications, and power supply) • Rx IF signal fed to both Online and Backup units. Rx switching supports all LNB interface signals (RF, 10 MHz reference, and power supply.)
Switch Conditions	Tx/Rx switching follows state of supporting data switching via control input from data switch.
IF Switching / Splitting	<ul style="list-style-type: none"> • Tx IF: Switched by RF relay (1.5 dB max loss, 40 dB min ON/OFF isolation) • Rx IF: Passive power splitting (7 dB max loss)
BUC Power Switching	Switched by power relay (60VDC max, 4A max)
BUC 10 MHz Reference Switching	Switched by relay (1 dB max loss, 70dB min ON/OFF isolation)
BUC FSK Comms Switching	Switched by relay (70dB min ON/OFF isolation)
LNB Power Switching	Switched by power relay (28 VDC max)
LNB 10 MHz Reference Switching	Switched by relay (1 dB max loss)
Tx-Rx Isolation	90dB min, 950-2250 MHz
IF Impedance	Optimized for 50Ω (> 10 dB return loss on external IF ports)
IF Connectors	50Ω Type N Female

IF Frequency Range	950-2250 MHz
Weight	1.1lbs (0.5kg)
Dimensions [excluding connectors]	1.7 H x 5.7 W x 4.1 D inches (43 H x 143 W x 104 D mm) Optional 19-inch rack mounting kit available.(CEFD P/N KT/11708)
Power requirements	<ul style="list-style-type: none">• + 12 volts DC @ 130 mA (max)• Power supplied by modems or from the CRS-150 1:1 Redundancy Switch (when used in tandem with the CDM-600L [CLM-9600L] modem), or from the SMS-301 1:1 Redundancy Switch (when used in tandem with the SDM-300L modem).
Approvals	'CE' as follows: <ul style="list-style-type: none">• EMC• Safety

Chapter 2. INSTALLATION

2.1 Unpack and Inspect the Shipment

The CRS-170A L-Band 1:1 Redundancy Switch module and its optional Installation and Operation Manual (otherwise available online at <http://www.comtechefdata.com>) were packaged and shipped in a reusable cardboard carton containing protective foam spacing.



CAUTION – THIS EQUIPMENT CONTAINS PARTS AND ASSEMBLIES SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). USE ESD PRECAUTIONARY PROCEDURES WHEN HANDLING THE EQUIPMENT.

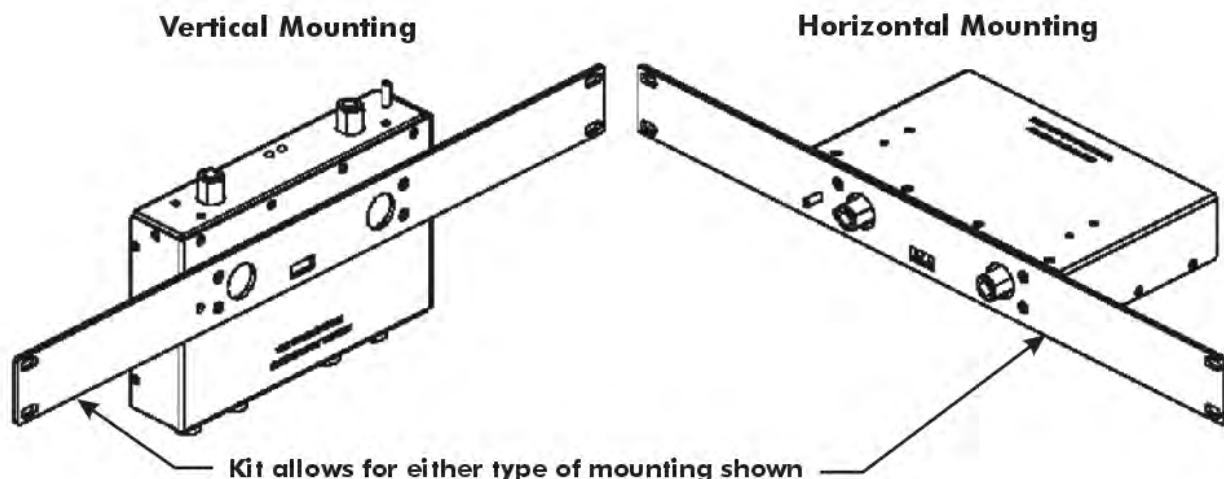


Once opened, inspect the shipment:

Step	Task
1	Keep all shipping materials.
2	Check the packing list to make sure the shipment is complete.
3	Inspect the equipment for damage. If damage exists, immediately contact the carrier and Comtech EF Data to submit a damage report.
4	Read the manual.

2.2 Mount the Switch

The CRS-170A switch module's small size and weight allow it to be freestanding. You may choose to let the module hang freely, supported only by the interfacing cables.



Comtech EF Data KT/11708 Switch Mounting Kit		
CEFD P/N	Qty	Description
FP/PN11575-1	1	Switch Mounting Panel
HW/6-32X3/8FLT	4	#6-32 x 3/8" LG SS Flat Head Machine Screw

Figure 2-1. Optional KT/11708 Switch Mounting Kit

You may also mount the module into a 1RU space at the front or rear of the rack enclosure that houses the modems. The optional Comtech EF Data KT/11708 Mounting Panel Kit is available for this purpose. As shown in **Figure 2-1**, the module can be installed vertically or horizontally to the kit's slotted mounting panel. User-supplied screws are then required to secure the panel to the rack enclosure threaded mounting rails.



CAUTION – PROPER GROUNDING PROTECTION IS REQUIRED. The equipment must be connected to the protective earth connection at all times. It is therefore imperative that the Switch and its paired modems are properly grounded – using the ground stud provided on the Switch antenna side panel and the ground studs located on the modem rear panels – during installation, configuration, and operation.

Chapter 3. SWITCH CONNECTORS AND PINOUTS

3.1 Cabling Connection Types

The cable and connector types described in this section are commonly used in many Comtech EF Data products. Each cable type is typically dedicated to a specific mode of operation.

The CRS-170A L-Band 1:1 Redundancy Switch and its compatible Traffic and Redundant Modems may not use all of these connector types.



The European EMC Directive (EN55022, EN50082-1) requires that you use properly shielded cables for DATA I/O. These cables must be double-shielded from end-to-end, ensuring a continuous ground shield.

3.1.1 Coaxial Cable Connections

Figure 3-1 show the coaxial cables (plugs) and their mating connectors (jacks/sockets) that Comtech EF Data uses with their products: 'BNC', 'TNC', 'N', 'F', and 'SMA'.





Coupling Type	Connector Type	
	Plug (Male)	Jack (Female)
Bayonet (Type 'BNC' shown)		
Threaded (Type 'N' shown)		

Figure 3-1. Coaxial Connector Examples

These connectors are available in two coupling styles: **Bayonet** or **Threaded**:

- **Bayonet Coupling Style** – The jack has a pair of guideposts that accommodate the plug's lockdown slots. This lockdown design provides secure assembly without over-tightening the connection.
- **Threaded Coupling Style** – The jack features external threads. The plug shell features internal threads, and has either a knurled outer surface to permit hand-tightening of the connection, or hex flats to accommodate torqued installation.

Connection Instructions:

- **Bayonet Coupling Connections:** Use the plug slots to guide, then slide the plug onto the jack posts. Then, turn the plug clockwise until the jack posts are fully seated within the plug slot.
- **Threaded Coupling Connections:** Engage the plug onto the jack threads, and then turn the plug clockwise until it is fully threaded onto the jack. Do not over-tighten the connection.

3.1.1.1 Type 'BNC'

BNC connectors feature a **Bayonet Coupling** design.



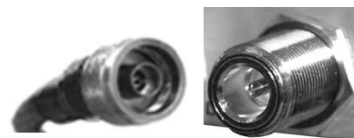
3.1.1.2 Type 'TNC'

TNC connectors feature a **Threaded Coupling** design similar to Type 'N', Type 'F', and Type 'SMA' connectors.



3.1.1.3 Type 'N'

Type 'N' connectors feature a **Threaded Coupling** design similar to Type 'TNC', Type 'F', and Type 'SMA' connectors.



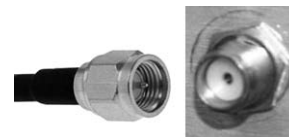
3.1.1.4 Type 'F'

Type 'F' connectors feature a **Threaded Coupling** design similar to Type 'TNC', Type 'N', and Type 'SMA' connectors.



3.1.1.5 Type 'SMA' (Subminiature Version 'A')

Type 'SMA' connectors feature a **Threaded Coupling** design similar to Type 'TNC', Type 'N', and Type 'F' connectors.



3.1.2 D-Subminiature Cable Connections

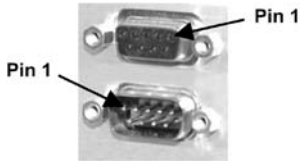

Type 'D' Connection Type	Example
Chassis Receptacles: (TOP) Female (BOTTOM) Male	
Type 'D' Cable With Jack Screws (Female Shown)	

Figure 3-2. D-Subminiature Connector Examples

D-Subminiature connectors are also called **Type 'D'** or **'D-Sub'** connectors. The connector pair features multiple rows of pins (male side) coupled to mating sockets (female side). The cable plug and chassis receptacle each feature a D-shaped profile that interlock to ensure proper pin orientation and connector seating.

Either chassis receptacle gender features two jack nuts for secure assembly of the cable plug to the chassis receptacle.

Whether its gender is male or female, the cable plug features two jack screws for secure connection to the jack nuts provided on the mating chassis receptacle. The jack screws may be hand tightened or tightened with a standard flat-blade screwdriver.

Connection Instructions: Orient the plug to the receptacle in the proper position. Press firmly into place. Use the jack screws to secure the plug to the receptacle jack nuts. Do not over-tighten.

About connector pinout tables: Figure 3-2 identifies the Pin 1 location for either gender connector. Unless noted otherwise, the connector pinout tables provided in this manual arrange/order information (i.e., the Pin # column/row) based on this orientation.

3.1.3 RJ-45, RJ-48 Cable Connections

The plug for an RJ-45 or RJ-48 cable features a flexible tab. The RJ-45 or RJ-48 jack features a mating slot. This design configuration assures proper installation and pin orientation.



Connection Instructions: Press down the tab on the cable plug, and then insert the plug into the RJ-4x jack. The connection is complete when the tab ‘clicks’ into position inside the jack.

3.2 CRS-170A User Connectors

3.2.1 Modem Side Connectors

The modem side connectors (**Figure 3-3**) provide all necessary external connections between the CRS-170A and the compatible Comtech EF Data modems.

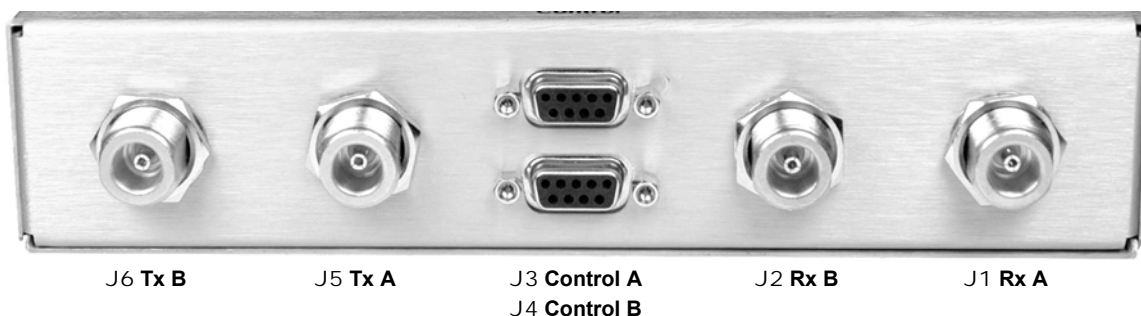


Figure 3-3. CRS-170A – Modem Side Connectors

3.2.1.1 IF Connectors (50Ω Type ‘N’)



Four 50Ω Type ‘N’ female connectors are provided on the modem side of the CRS-170A.

Table 3-1. Modem Side Type ‘Type ‘N’ Connectors

Ref Des	Name	Description	Direction
J1	Rx A	RX-IF signal	Out
		LNB 10 MHz Ref	In
		LNB Power	In
J2	Rx B	RX-IF signal	Out
		LNB 10 MHz Ref	In
		LNB Power	In
J5	Tx A	TX-IF signal	In
		BUC 10 MHz Ref	In
		BUC FSK Comm.	In/Out
		BUC Power	In
J6	Tx B	TX-IF signal	In
		BUC 10 MHz Ref	In
		BUC FSK Comm.	In/Out
		BUC Power	In

3.2.1.2 J3 | Control Connector (Top) – Modem ‘A’ (DB-9F)



The **Modem ‘A’** Control connector is a 9-pin Type ‘D’ female interface. Pins 2, 3, and 4 carry signals looped through the switch module from **Modem ‘B’** to **Modem ‘A’**, while pins 6, 7, and 8 loop the same signals from **Modem ‘A’** through to **Modem ‘B’**. The 12VDC input, which is diode OR’ed with the corresponding 12VDC input from **Modem ‘B’**, powers the switch module.

Table 3-2. J3 | Control A Modem Connector Pinouts

Pin	Signal Name	Signal Function	Direction
5	Ground	Signal Ground	---
9	+12VDC	+12 VDC	In
4	ONLINE_A	Modem ‘A’ Online	Out
8	SERIAL_FAULT_A	Modem ‘A’ Serial Faults	In
3	CLK_OUT_B	Modem ‘B’ Clk Out	Out
7	CLK_IN_A	Modem ‘A’ Clk In	In
2	AUX_SER_TX_B	Modem ‘B’ Tx Comms	Out
6	AUX_SER_TX_A	Modem ‘A’ Tx Comms	In
1	Ground	Signal Ground	---

3.2.1.3 J4 | Control Connector (Bottom) – Modem ‘B’ (DB-9F)



The **Modem ‘B’** Control connector is a 9-pin Type ‘D’ female interface. Pins 2, 3, and 4 carry signals looped through the switch module from **Modem ‘A’** to **Modem ‘B’**, while pins 6, 7, and 8 loop the same signals from **Modem ‘B’** through to **Modem ‘A’**. The 12VDC input, which is diode OR’ed with the corresponding 12 VDC input from **Modem ‘A’**, powers the switch module.

Table 3-3. J4 | Control B Modem Connector Pinouts

Pin	Signal Name	Signal Function	Direction
5	Ground	Signal Ground	---
9	+12VDC	+12VDC	In
4	ONLINE_B	Modem ‘B’ Online	Out
8	SERIAL_FAULT_B	Modem ‘B’ Serial Faults	In
3	CLK_OUT_A	Modem ‘A’ Clk Out	Out
7	CLK_IN_B	Modem ‘B’ Clk In	In
2	AUX_SER_TX_A	Modem ‘A’ Tx Comm	Out
6	AUX_SER_TX_B	Modem ‘B’ Tx Comm	In
1	Ground	Signal Ground	---

3.2.2 Antenna Side Connectors



- See Sect. 1.3.1 in Chapter 1. INTRODUCTION for information about the LED Indicators.
- See Sect. 1.3.1 in Chapter 1. INTRODUCTION and Sect. 4.9 in Chapter 4. MODEM AND SWITCH CONFIGURATION for information about the “Switch Conditions” and “Intelligent / Dumb Controller” DIP Switches.



Figure 3-4. CRS-170A – Antenna Side Connectors and Ground Stud (Rev. A and Later Version)

3.2.2.1 RF Connectors (50Ω Type ‘N’)



Two 50Ω Type ‘N’ female connectors on the antenna side of the CRS-170A provide the coaxial cable connections to the outdoor receive and transmit equipment.

Table 3-4. J7 | Rx and J8 | Tx ‘Type ‘N’ Connectors

Ref Des	Name	Connector Type	Function
J7	Rx	Type ‘N’	RF Input
J8	Tx	Type ‘N’	RF Output

3.2.2.2 Ground Stud



CAUTION – PROPER GROUNDING PROTECTION IS REQUIRED. THE INSTALLATION INSTRUCTIONS REQUIRE THAT YOU MUST ENSURE THE INTEGRITY OF THE PROTECTIVE EARTH AND THAT YOU MUST MAINTAIN THE EQUIPMENT’S CONNECTION TO THE PROTECTIVE EARTH AT ALL TIMES.



Use the #10-32 stud provided on the antenna side of the Switch for connecting a common chassis ground among equipment.

Chapter 4. MODEM AND SWITCH CONFIGURATION

4.1 Overview



To avoid damage either to the modem pair or the CRS-170A switch, it is important that you follow this sequence of configuration:

- **First**, configure both modems for 1:1 redundant operation as directed in this chapter. This chapter organizes the modem-specific sections and any specific interface configuration examples as follows:

For Modem...	See Chapter Sect.
CDM-625/A	4.2
CDM-850 or CDM-840	4.3
CDM-760 or CDM-750	4.4
CDM-570L/AL	4.5
CDM-710GL, CDM-710, or CDM-700	4.6
CDM-600L (CLM-9600L)	4.7
SDM-300L3	4.8

- **Second**, once you properly configure both modems for 1:1 redundant operation, set the DIP switches on the CRS-170A to the correct modem selection. See Sect. 4.9 CRS-170A Switch DIP Settings for details.
- **Third**, once you properly configure both modems and the DIP switches, connect the control and IF cables between the powered OFF modems and switch. See Chapter 5. CABLES and CONNECTIONS for details.

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4.2 Configure the CDM-625/As for 1:1 Redundancy



- CDM-625A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A)
- CDM-625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625)

The CDM-625/A Advanced Satellite Modem automatically detects if it is connected to a 1:1 redundancy system – the steps required to configure both modems are therefore minimal, with some exceptions:

- If the CDM-625/A has the optional IP Packet Processor **installed and enabled**, 1:1 Redundancy is controlled from the CDM-625/A HTTP (Web Server) Interface **Redundancy** page.

When both the traffic and backup modems are equipped with the optional IP Packet Processor and are connected to the CRS-170A L-Band 1:1 Redundancy Switch), there is no need to use the drop-down menu here, as Packet Processor Redundancy is enabled *automatically*.

CDM-625: Comtech EF Data Modem :: Redundancy

Home Admin Configuration Status ODU Redundancy

Redundancy Config

Redundancy Traffic IP Address: 192.001.001.010 / 24

1:N mode (use with CAUTION!): Disabled

Packet Processor Redundancy: Disabled

Submit

Force 1:1 switch (Only applies to Online modem)

Force 1:1 Switch

Redundancy Monitor

Online

1:1 Switch is Not connected

Refresh

If you wish to operate either modem outside of the redundant setup as a standalone unit, use the drop-down menu to select **Packet Processor Redundancy** for that specific modem as **Disabled**.

- If terrestrial data is *not* Ethernet and CnC will *not* be used, then no modem 1:1 redundancy configuration is needed. Otherwise, if either applies, refer to the sections that follow.

4.2.1 CDM-625/A Remote User M&C Ethernet Interface

4.2.1.1 For CDM-625/As Without the Optional IP Packet Processor

You may configure one of the CDM-625/A's four available 10/100 Ethernet ports for M&C Ethernet. As configured in **Dedicated Management Port Mode**, when the modem is offline the *M&C-designated port* remains functional and available for operation, while the three remaining ports are unavailable. Otherwise, if *none* of the 10/100 Ethernet ports are reserved for M&C operation; *all four ports* become unavailable when the modem is offline.



See the CDM-625A or CDM625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A or MN-CDM625) for instructions to configure one of the four 10/100 Ethernet ports as the Dedicated Management Port for remote Ethernet M&C.



TO AVOID ETHERNET NETWORKING LOOPS – If you configure more than one Ethernet port for Ethernet traffic, you must use separate Layer 2 switches unless the Layer 2 switch in use isolates these ports from one another.

4.2.1.2 For CDM-625/As Equipped With the Optional IP Packet Processor

You may **not** configure your modem for Dedicated Management Port Mode when the optional IP Packet Processor is **installed and enabled**. Under such functionality, in 1:1 redundancy Port 1 is available *only* for M&C on both modems, while Ports 2, 3, and 4 are disabled when a modem is in the Offline state.




TO AVOID ETHERNET NETWORKING LOOPS – While in 1:1 Redundancy mode, with the optional IP Packet Processors enabled and both units operating in Managed Switch Mode, the Port 1 M&C Ethernet must be isolated from the Ethernet Traffic. Also, if you use more than one of the Traffic Ports (Ports 2, 3, or 4), you must use separate Layer 2 switches unless the Layer 2 switch in use isolates these ports from one another.

4.2.2 Configure CDM-625/A Carrier-in-Carrier® for Redundancy Operation

The **Pre-Mapped Symbol Interface (PMSI)** is associated with DoubleTalk® Carrier-in-Carrier®. It permits the modulator in a selected unit to provide a direct copy of its output (the outbound interferer) to the second modem. The other modem may then choose to take the PMSI signal and use it for its own CnC reference. In 1:1 redundancy, the PMSI is an EIA-485 multi-drop bus system where one device transmits and the other device on the multi-drop bus is configured to receive.

If you use Carrier-in-Carrier® (CnC), you must configure the CnC control setting to **Redundancy** mode using the CDM-625/A front panel menus.

Do these steps to configure the CnC control setting for CDM-625/A 1:1 Redundancy:

Step	Task
1	<p>From the modem front panel menu – Use the ◀▶ arrow and ENTER keys to select the PMSI control mode menu:</p> <p style="text-align: center;">SELECT: Configuration → CnC → PMSI-control</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>CnC PMSI mode: Redundancy (Idle, Redundancy, Talk, Listen) (◀▶)</p> </div> <p>Use the ▲ ▼ arrow keys to select Redundancy, and then press ENTER.</p>
2	<p>You will now need to connect the two modems together via use of a 1:1 PMSI cable (note that this cable bypasses the CRS-170A).</p> <div style="display: flex; align-items: center;">  <ul style="list-style-type: none"> Chapter 5. CABLES AND CONNECTIONS Appendix A. CABLE DRAWINGS </div>

[illegible]

4.3 CDM-850 or CDM-840 Operation in 1:1 Redundancy



- CDM-850 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM850)
- CDM-840 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM840)

The CDM-850 and CDM-840 Remote Routers automatically detect connection to a 1:1 redundancy system. With both units automatically configured for 1:1 operation, the online unit keeps the offline unit updated as online unit configuration changes occur.

Use the **Redundancy** section of the CDM-850 or CDM-840 HTTP (Web Server) Interface 'Utility | Utility' page (similar to the page shown in **Figure 4-1**, but subject to update) to manually force backup of the online unit. If the unit is part of a 1:1 redundant pair and this unit is currently *online*, click [**Force Redundancy Switch**] to force the current unit to switch to standby mode.

The screenshot shows the 'Utility' page of the CDM-850 or CDM-840 HTTP (Web Server) Interface. The page has a navigation bar with 'Home', 'Admin', 'Configuration', 'Status', 'Utility', and 'Reboot'. The 'Utility' section is active. Below the navigation bar, there are several sections:

- Modem**: Fields for Unit/Site Name (CDM850), System Contact (cdmipsupport@comtech), System Location ((480) 333-4357), Set Time (hh:mm:ss) (08:45:20), Set Date (dd/mm/yy) (16/01/00), Circuit ID (1), G.703 Clock Extended Mode (Off), 10 MHz Internal Adjustment (253), and Test Mode (Normal Mode). Each field has a 'Submit' button.
- Save/Load Configuration**: 'Save Configuration' and 'Load Configuration' buttons, each preceded by a 'Select Location' dropdown menu.
- BERT Config**: Fields for Tx Bert State (Off), Tx Bert Pattern (2^23-1), Error Insert (Off), Rx Bert State (Off), and Rx Bert Pattern (2^23-1). Each field has a 'Submit' button.
- BERT Monitor**: Fields for Total Errored Bits (0.000E+00), BER (0.000E+0), and Total Bits (0.000E+00). There are 'Restart' and 'Update' buttons.
- Redundancy** (highlighted with a red dashed border): Fields for Current Redundancy State (On Line), Offline Unit Mgmt IP (192.168.2.99), Offline Unit Status (No_1F1), Force Redundancy Switch, and Redundancy Detect Latch Set (Clear). There is a 'Submit' button for the Offline Unit Mgmt IP field.

Figure 4-1. CDM-850 or CDM-840 HTTP (Web Server) Interface 'Utility' Page Example (Page Banner, VFP not shown)

[illegible]

4.4 CDM-760 or CDM-750 Operation in 1:1 Redundancy



- **CDM-760 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM760)**
- **CDM-750 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM750)**

The CDM-760 and CDM-750 Advanced High-Speed Trunking Modems automatically detect connection to a 1:1 redundancy system.

Typical for either product, with both modems automatically configured for 1:1 operation, the online modem keeps the offline modem updated as online modem configuration changes occur.

You can also manually 'force' backup of the online modem. Use the modem front panel to select the **SELECT: Utility ► 1:1** screen:

Press ENTER key to force Unit into Standby (1:1 only)

If this unit is currently the *online* unit in a 1:1 redundant pair, press **ENTER** to force the unit to switch to standby mode.

[illegible]

4.5 Configure the CDM-570L/ALs for 1:1 Redundancy



- CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM)
- CDM-570A/CDM-570AL/CDMR-570AL Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM570A)



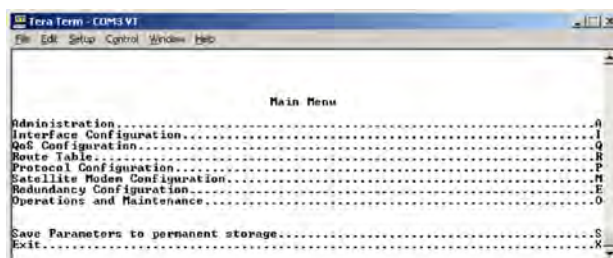
For correct operation of the CRS-170A, the CDM-570/A Satellite Modems must have the following installed:

- CDM-570AL Base Modem Firmware Version 1.1.1 (or higher)
- CDM-570AL with Optional IP Packet Processor Firmware Version 1.2.1 (or higher)
- CDM-570L Base Modem Firmware Version 1.6.7 (or higher)
- CDM-570L with Optional IP Module Firmware Version 1.5.4.2 (or higher)
- CDM-570L Hardware Revision 3

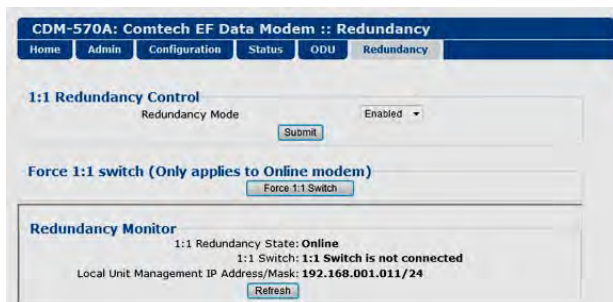
If your modems do not meet this requirement, contact Comtech EF Data Product Support. You may download free Firmware updates from the Comtech EF Data web site. Hardware revision upgrades must be performed at Comtech EF Data.



Front Panel



Telnet Command Line Interface (CLI)



Ethernet HTTP (Web Server) Interface



Figure 4-2. CDM-570L/AL Configuration Interface Examples

Because the modem automatically detects if it is connected to a 1:1 redundancy system, the steps required to configure both modems are minimal. Modem configuration, monitor and control are possible through **local** or **remote** means (**Figure 4-2**):

- **Local Control** – Use the modem front panel to fully configure, monitor, and control the modem operation:
 - The LEDs indicate, in a summary fashion, the status of the modem.
 - The VFD (Vacuum fluorescent Display) is an active display showing two lines of 24 characters each. It produces a blue light with adjustable brightness. Nested menus display all available options and prompt you to carry out a required action.
 - The keypad comprises six individual keyswitches. The keys have a positive ‘click’ action that provides tactile feedback. Enter data via the keypad. Data, prompts, and messages are displayed on the VFD.
- **Serial Remote Control** – Configuration, monitoring and control of redundant systems is possible via remote means over an RS-485 multi-drop bus using Windows Command-Line, where data is transmitted in asynchronous serial form using ASCII characters.
- **Ethernet Remote Control** – Configuration, monitoring and control of redundant systems is possible via remote means over an Ethernet connection using the Telnet Command Line Interface (CLI) or the CDM-570L/A HTTP (Web Server) Interface.

4.5.1 CDM-570L/AL Non-IP Redundancy Configuration

Do these steps for setup of CDM-570L/AL modems for 1:1 Redundancy, when the terrestrial data type is **non-Ethernet** (i.e. RS422, G.703).


Step	Task
1	<p>Enable 1:1 Redundancy on both modems:</p> <ul style="list-style-type: none"> From the CLI Main Menu, press 'E' to open the 1:1 Redundancy Configuration page. <ul style="list-style-type: none"> Press 'R' to toggle 1:1 Redundancy as [Enabled]. Press 'S' to Save Parameters to permanent storage. Alternately, using the HTTP (Web Server) Interface 'REDUNDANCY' page: <ul style="list-style-type: none"> Use the drop-down list in the 1:1 Redundancy Control section of this page to select Enabled. Click [Submit] to save. <div>  <p>If you submit any changes to this web page when the CDM-570AL optional IP Packet Processor is INSTALLED, you must also open the 'Admin Pap Save' page and immediately click [Save PaP Parameters].</p> </div>
2	<p>Connect all cables to the modems and the CRS-170A. This includes the control cable, IF cable and data 'Y' cables.</p> <div>  <p>Chapter 5. CABLES AND CONNECTIONS</p> </div>

4.5.2 IP Redundancy Configuration



Before continuing you must remember that, when you use the Command Line Interface (CLI), you can make configuration changes to the Online modem only. Make sure to press 'S' to "Save Parameters to permanent storage" after making any changes to an active CLI page. This ensures that the configuration change is also applied to the Backup modem.

Do these steps for setup of a CDM-570L/AL 1:1 IP Redundancy System:

Step	Task
1	Use a Layer 2 switch (preferred) or hub to establish an Ethernet connection between the two modems.
2	<p>Before you connect the modems to the CRS-170A, you must first use the modem CLI to configure the following CDM-570LAL IP operation settings:</p> <ul style="list-style-type: none"> • Disable 1:1 Redundancy operation – From the Main Menu, press 'E' to open the 1:1 Redundancy Configuration page. <ul style="list-style-type: none"> ○ Press 'R' to toggle 1:1 Redundancy as [Disabled]. • From the Main Menu, press 'A' to open the Administration page. <ul style="list-style-type: none"> ○ Press 'W' (Administration → Working Mode) and set both modems to the same Working Mode. ○ Press 'F' (Administration → Feature Configuration) and make sure to configure, using all applicable submenus, both modems to have the same IP-related operability and settings.
3	<p>For each modem, use the CLI to enter a unique IP Address that is on the same subnet:</p> <ul style="list-style-type: none"> • From the Main Menu, press 'I' to open the Interface Configuration page. • Press 'E' to open the Ethernet Interface page (Interface Configuration → Ethernet Interface): • Press 'I' to enter the IP Address.
4	<p>Verify that you can ping from one modem to the other:</p> <ul style="list-style-type: none"> • From the Main Menu, press 'O' to open the Operations and Maintenance page. • Press 'G' to open the Diagnostics page (Operations and Maintenance → Diagnostics): • Press 'P' and then enter the IP Address of the other modem in the redundant pair.
5	<p>Re-enable 1:1 Redundancy operation – From the Main Menu, press 'E' to open the 1:1 Redundancy Configuration page.</p> <ul style="list-style-type: none"> • Press 'R' to toggle 1:1 Redundancy as [Enabled].
6	Power down both modems.
7	<p>Connect the modems to the CRS-170A.</p> <div>  <p>CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM): Sect. H.6 Cabling with the CDM-570L.</p> </div>

Step	Task
8	<p>Power on both modems at the same time. Observe the CRS-170A Online LEDs to see which modem is the Online modem. Monitor the CLIs for both modems to confirm the following:</p> <p>Online modem CLI displays: 1:1 Redundancy (Auto Detected) Redundancy: PARAM File Connection Established. Redundancy: Sending PARAM File...</p> <p>Offline modem CLI displays: 1:1 Redundancy (Auto Detected) Redundancy: Received PARAM File... Writing 5447 bytes to PARAM file on Flash</p>
9	<p>On the Online modem, view the CLI 1:1 Redundancy Configuration page (Figure 4-3) to confirm that the correct Management IP Addresses and Prefix Lengths display for the Local and Redundant Units.</p> <p>Then, press 'T' to set the Traffic IP Address, and 'M' to set the Traffic Subnet Prefix Length (these also need to be in the same subnet as the Management IP addresses).</p>

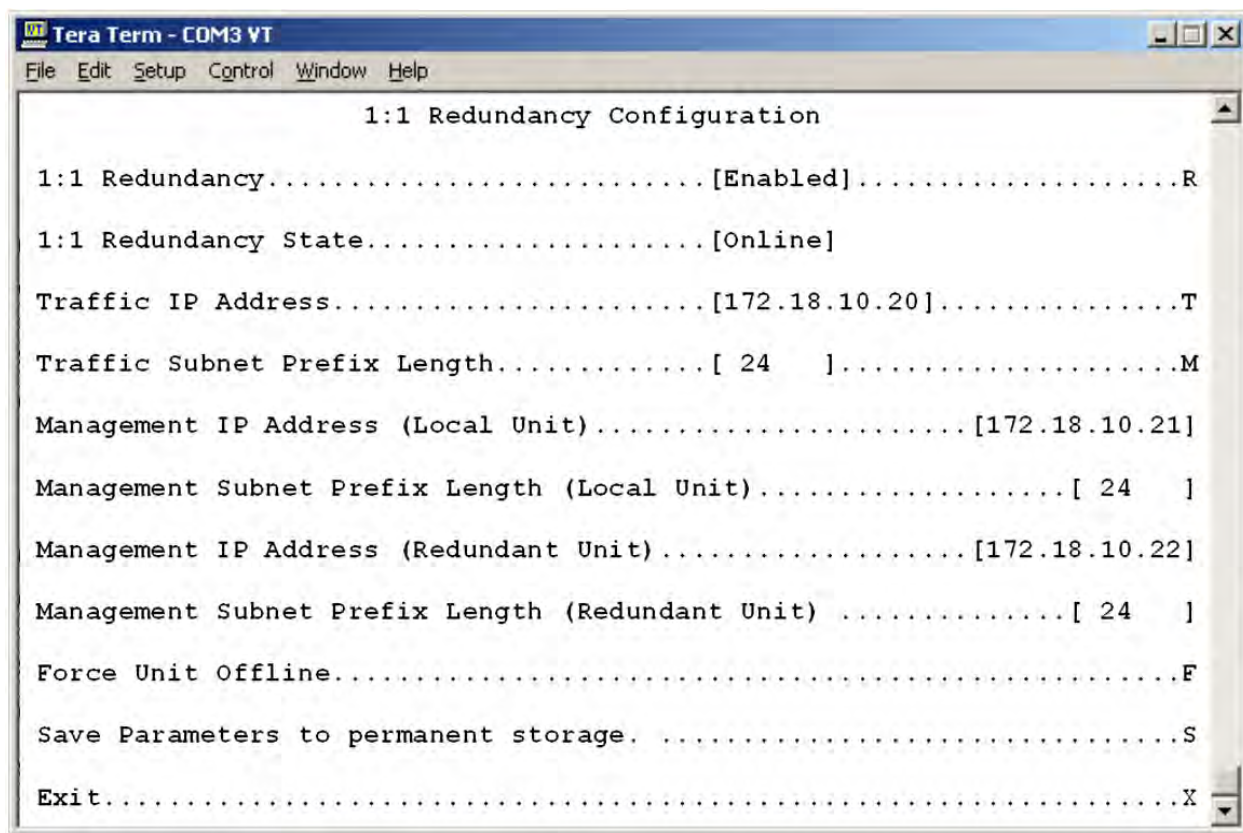


Figure 4-3. CDM-570L/AL CLI 1:1 Redundancy Configuration Screen

[illegible]

4.6 Configure the CDM-710GLs, -710s, or -700s for 1:1 Redundancy



- CDM-710G/710GL Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM710G)
- CDM-710 Broadcast Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM710.IOM)
- CDM-700 Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM700.IOM)



For correct operation of the CRS-170A, the CDM-710GL, -710, and -700 modems must have the following installed:

- For the CDM-710GL:
 - Firmware Version 5.1.1 (or higher)
- For the CDM-710:
 - Firmware Version 2.4.1 (or higher)
 - Hardware Revision A (chassis with round-buttoned keypad)
- For the CDM-700:
 - Firmware Version 1.1.6 (or higher)
 - Hardware Revision A (chassis with round-buttoned keypad)

Note that Hardware upgrades are possible only for the CDM-710 or CDM-700 Rev. A version chassis and later – 1:1 redundancy operation is *not* available with hardware versions prior to Rev. A.

If your modems do not meet these requirements, contact Comtech EF Data Product Support. You may download free Firmware updates from the Comtech EF Data web site. Hardware revision upgrades must be performed at Comtech EF Data.


Modem configuration, monitor and control are possible through **local** or **remote** means:

- **Local Control** – Use the modem front panel to fully configure, monitor, and control the modem operation:
 - The LEDs indicate, in a summary fashion, the status of the modem.
 - The VFD (Vacuum fluorescent Display) is an active display showing two lines of 24 characters each. It produces a blue light with adjustable brightness. Nested menus display all available options and prompt you to carry out a required action.
 - The keypad comprises six individual keyswitches. The keys have a positive ‘click’ action that provides tactile feedback. Enter data via the keypad. Data, prompts, and messages are displayed on the VFD.

- **Serial Remote Control** – Configuration, monitoring and control of redundant systems is possible via remote means over an RS-485 multi-drop bus using Windows Command-Line, where data is transmitted in asynchronous serial form using ASCII characters.
- **Ethernet Remote Control** – Configuration, monitoring and control of redundant systems is possible via remote means over an Ethernet connection using the CDM-7XX HTTP (Web Server) Interface.


4.6.1 Non-IP Redundancy Configuration

Do these steps for setup of the CDM-710GL, -710, or -700 modems for 1:1 Redundancy when the terrestrial data type is **non-Ethernet** (e.g., ASI, HSSI, G.703):

Step	Task
1	Enable the redundancy state for both modems. From the modem front panel: CONFIG: AUX (Redundancy Mode) → ENA/DIS – set to Enable.
2	Connect all cables – including the control cable, IF cable and data cables – to the modems and the CRS-170A.  Chapter 5. CABLES AND CONNECTIONS

4.6.2 IP Redundancy Configuration

Do these steps for setup of the CDM-710GL, -710, or -700 modems for 1:1 IP Redundancy (i.e., when the terrestrial data type is **Gigabit Ethernet (GigE or GbE)**):

Step	Task
1	Before connecting the modems to the CRS-170A, you must first configure the following IP module settings on each modem. From the modem front panel: CONFIG: AUX (Redundancy Mode) → ENA/DIS set to Disable.
2	Enable the redundancy state for both modems. From the modem front panel: CONFIG: AUX (Redundancy Mode) → ENA/DIS set to Enable. Press ENTER to save your settings.
3	Connect all cables – including the control cable, IF cable and data cables – to the modems and the CRS-170A. Additionally, you must use a Layer 2 switch to establish an Ethernet connection between each modem.  Chapter 5. CABLES AND CONNECTIONS
4	Verify that the ONLINE LEDs for the CRS-170A indicate the same online state as displayed by the modems' front panel LEDs.

4.7 CDM-600L (CLM-9600L) Operation in 1:1 Redundancy



- CLM-9600L Open Network Satellite Modem Installation and Operation Manual (CEFD P/N MN/CLM9600L.IOM)
- CRS-150 1:1 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/CRS150.IOM)



- 1) Correct operation of the CRS-170A requires use of the CRS-150 1:1 Redundancy Switch.
- 2) While the CDM-600L (CLM-9600L) Open Network Satellite Modems require no unique 1:1 configuration settings, they must have the following installed:
 - Firmware Version 1.1.4 (or higher)
 - Hardware Revision 3

If the modems do not meet this requirement, contact Comtech EF Data Product Support. Firmware updates are free and may be downloaded from the Comtech EF Data web site. (www.comtechefdata.com). Hardware revision upgrades must be performed at CEFD.

4.8 SDM-300L3 Operation in 1:1 Redundancy



- SDM-300L3 Satellite Modem Installation and Operation Manual (CEFD P/N MN/SDM300L3.IOM)
- SMS-301 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/SMS301.IOM)



- 1) Correct operation of the CRS-170A requires use of the SMS-301 Redundancy Switch.
- 2) While the SDM-300L3 Satellite Modems need no unique 1:1 configuration settings, they must have the following installed:
 - Firmware Version 1.1.4 (or higher)
 - Hardware Revision 3

If the modems do not meet this requirement, contact Comtech EF Data Product Support. Firmware updates are free and may be downloaded from the Comtech EF Data web site. (www.comtechefdata.com). Hardware revision upgrades must be performed at CEFD.

[illegible]

4.9 CRS-170A Switch DIP Settings


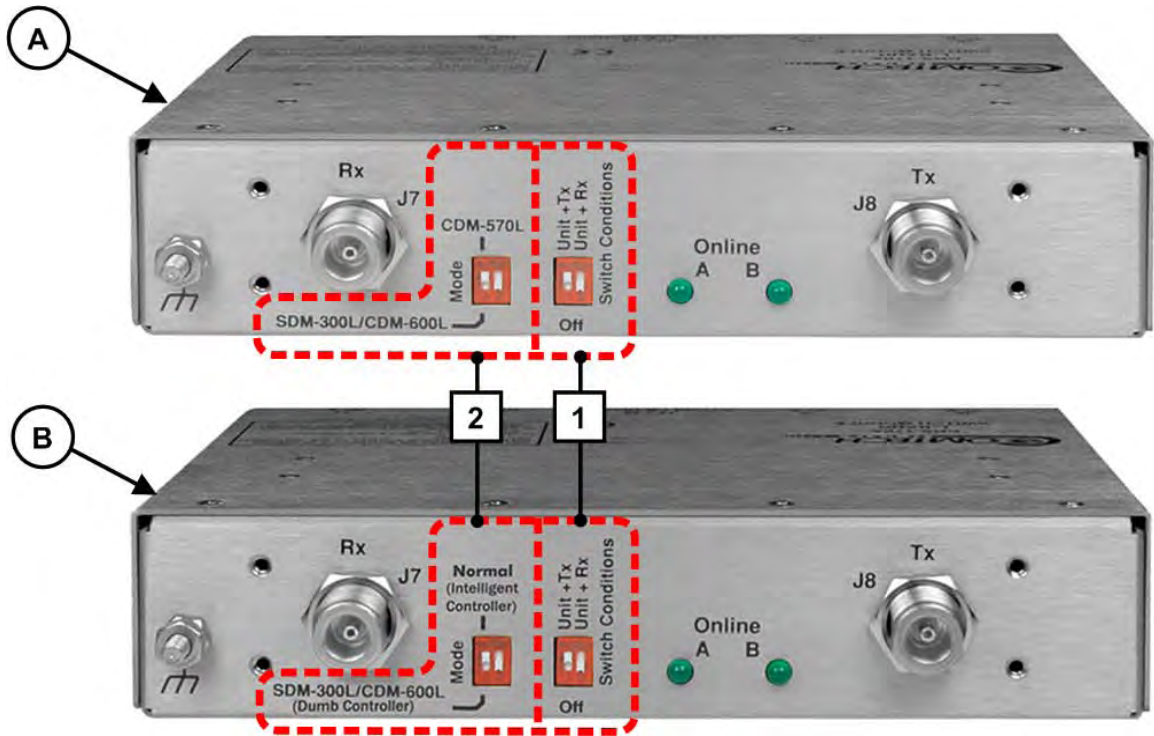
 The ‘Switch Conditions’ DIP switches are set depending upon the type of Tx or Rx traffic conditions resultant of switchover. Some modems have additional settings or alarm masks that affect conditions – see your individual modem manual for detailed explanations.

Figure 4-4 shows the DIP switches provided on the Antenna Side of the CRS-170A L-Band 1:1 Redundancy Switch (towards the BUC and LNB). Use these features to set the ‘Mode’ and ‘Switch Conditions’.

Note that the ‘Mode’ DIP switch labeling differs between the original and current (i.e., Rev. ‘A’ and later) versions of the CRS-170A.













On the next page, Table 4-1 details the settings for the ‘Mode’ DIP switch set on a per-modem basis, and the ‘Switch Conditions’ DIP switch settings that determine switchover functionality for a given redundancy configuration.



Switch Version	Item	Description
A – Original Chassis Design	1	“Switch Conditions” DIP Switches
	2	“Mode Settings” DIP Switches
B – Rev ‘A’ and LATER Design		

Figure 4-4. CRS-170A Antenna Side – DIP Switches

Table 4-1. CRS-170A DIP Switch Settings

'Mode' DIP Settings				'Switch Conditions' DIP Settings			
Modem	DIP	Left Switch	Right Switch	DIP	Left Switch	Right Switch	Result
CDM-625/A CDM-850 CDM-840		Up	Down		Down (Off)	Down	Switchover upon a Unit fault
CDM-760 CDM-750 (L-Band)		Up	Down		Up	Down	Switchover upon a Unit or Tx Traffic fault
CDM-570AL CDM-570L		Up	Down		Down	Up	Switchover upon a Unit or Rx Traffic fault
CDM-710GL		Up	Down		Up	Up	Switchover upon a Unit or Tx Traffic or Rx Traffic fault
CDM-710 (L-Band)		Up	Down				
CDM-700 (L-Band)		Up	Down				
CDM-600L (CLM-9600L)		Down	Up				
SDM-300L3		Down	Down				

Chapter 5. CABLES AND CONNECTIONS

5.1 Overview

When assembling a Comtech EF Data 1:1 Redundancy System, in addition to purchasing the desired modem pair (one Redundant Modem, one Traffic Modem), you must also purchase a redundancy kit tailored to that modem choice. Each kit provides the CRS-170A L-Band 1:1 Redundancy Switch module, plus all cables and components required for interconnection of the redundant configuration to various interfaces (i.e., control, IF, and data) excluding Ethernet, which requires user-provided cables and Layer 2 switching.



- 1) **The cables required between each modem and Switch should be of shielded, twisted-pair construction, with the grounded shield bonded to the back shell. All data cables should be wired correctly using the pinout and connection information as specified in Appendix A. CABLE DRAWINGS.**
- 2) **It is physically impossible to connect all available data interface solutions within a single 1:1 redundancy system at a given time. For example, when using the CDM-625/A in a 1:1 system, you are unable to establish an ASI interface together with a G.703 Unbalanced interface, or an EIA-422/232 interface together with an HSSI interface. Therefore, the quantities of cables and accessories furnished with each redundancy kit have been predetermined with this operational limitation taken into consideration.**
- 3) **The type of 1:1 Y-Splitter cable required for modem-to-user interconnection depends on your data interface. It is essential to ensure that the control and IF connections, both Rx and Tx, are made correctly.**
- 4) **The Electronic Industries Association (EIA) designations supersede the Recommended Standard (RS) designations. References to the old designations may be shown when depicting actual text (e.g., RS-232) displayed on Switch or the individual modem Web Server pages, serial remote interfaces, Telnet Command Line Interfaces (CLIs), or unit rear panels. All other references in the manual refer to EIA designations.**

5) The modem-specific sections in this chapter identify the required redundancy kit:

- **Sect. 5.2 Common CRS-170A 1:1 Redundancy Control / IF Interface Cabling Kits**
- **Sect. 5.3 Cabling the CDM-625 or CDM-625A**
- **Sect. 5.4 Cabling the CDM-850**
- **Sect. 5.5 Cabling the CDM-840**
- **Sect. 5.6 Cabling the CDM-760 or CDM-750**
- **Sect. 5.7 Cabling the CDM-570L/AL**
- **Sect. 5.8 Cabling the CDM-710GL**
- **Sect. 5.9 Cabling the CDM-710**
- **Sect. 5.10 Cabling the CDM-700**
- **Sect. 5.11 Cabling the CDM-600L (CLM-9600L)**
- **Sect. 5.12 Cabling the SDM-300L3**

Separately sold interface kits and cable assemblies are available to facilitate connection from the modems to a variety of user terrestrial data interfaces. Examples of these cabling configurations are further identified throughout this chapter.

5.2 Common CRS-170A 1:1 Redundancy Control / IF Interface Cabling Kits

When assembling a Comtech EF Data 1:1 Redundancy System, in addition to purchasing the desired modem pair (one Traffic Modem, one Backup Modem), you must also purchase the CRS-170A 1:1 Redundancy Control/IF Interface Cabling Kit tailored to your modem choice. Each kit provides the CRS-170A L-Band 1:1 Redundancy Switch module and the control and IF cables required for connection of the switch to the modems in the 1:1 redundancy configuration.

Kit usage, on a per-modem basis, is as follows:

CRS-170A 1:1 Redundancy Control / IF Interface Cabling Kit	Modem Pair	Control Connections Figure	IF Connections Figure(s)
KT-0000160	CDM-625 or CDM-625A	5-1	5-2, 5-3
	CDM-850	5-17	5-18
	CDM-840	5-22	5-23
	CDM-760 or CDM-750	5-26	5-27
KT/12551	CDM-710GL	5-39	5-40
	CDM-710	5-45	5-46
	CDM-700	5-51	5-52



- 1) The CDM-570L and CDM-570AL modems require a modem-specific redundancy kit, CEFD P/N KT/10860-1. See Sect. 5.7.1 for further information.

See Figure 5-59 in Sect. 5.11 for cabling requirements for the CDM-600L (CLM-9600) Open Network Satellite Modems.

See Figure 5-60 in Sect. 5.12 for cabling requirements for the SDM-300L3 Satellite Modems.

- 2) Separately sold kits are available to facilitate connection from the modem to various user terrestrial data interfaces, excluding Ethernet (which require user-provided CAT5 Ethernet cables and Layer 2 switches). Examples of such kit usage are provided in the “Modem-to-User Data Interface Connections and Examples” sections for each modem in this chapter.

5.2.1 KT-0000160 Redundancy Control / IF Interface Cabling Kit (CDM-625/A, CDM-850, CDM-840, CDM-760, CDM-750)

KT-0000160 1:1 Redundancy Control / IF Interface Cabling Kit			
CEFD Part No.	Qty	Description	Used For
PL/10129-1	1	CRS-170A Switch – Top Assembly	1:1 Redundancy
CA/WR9378-4*	2	Control Cable – Universal, DB-9M → DB-9M, 4'	Modem → Switch Control
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	Modem → Switch IF Interface



*** Alternate Cabling Note: CEFD Universal Control Cable CA/WR9378-8 (DB-9M → DB-9M, 8'), sold separately, is available for use in place of CA/WR9378-4**

5.2.2 KT/12551 Redundancy Control / IF Interface Cabling Kit (CDM-710GL, CDM-710, CDM-700)

KT/12551 1:1 Redundancy Control / IF Interface Cabling Kit			
CEFD Part No.	Qty	Description	Used For
PL/10129-1	1	CRS-170A Switch – Top Assembly	1:1 Redundancy
CA/WR12135-1*	2	Control Cable – Universal, DB-9M → DB-9M, 4'	CDM-710GL → Switch Control
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	CDM-710GL → Switch IF Interface



*** Alternate Cabling Notes:**

- 1) To provide User access to modem “Fault Summary Relay,” Control ‘Y’ Cable CA/WR13011-4 (DB-15F → DB-9M [4'], DB-9M [6'']), sold separately, is available for use in place of the CA/WR12135-1 cable.
- 2) Control Cable CA/WR12135-1 will mute the Offline modem’s Tx IF. If this is not desired, then an alternate cable, Control Cable CA-0000187 (DB-15F → DB-9M, 6'), sold separately, is available for use in place of the CA/WR12135-1 cable

5.3 Cabling to the CDM-625/A



1) For information on the CDM-625/A's 1:1 auto-enable functionality, see:

- Chapter 4. MODEM AND SWITCH CONFIGURATION
- CDM-625A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A)
- CDM-625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625)

2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.3.1 CRS-170A→CDM-625/A Control and IF Interface Connections Using Cabling Kit KT-0000160



You must order terrestrial data interface components/kits separately. See Sect. 5.3.2 for CDM-625/A terrestrial data interface configuration and connection examples and details.

You must use Comtech EF Data's KT-0000160 1:1 Redundancy Control/IF Interface Cabling Kit (Sect. 5.2.1) for your control and L-Band Modem-to-Switch cabling connections. **Figure 5-1**, **Figure 5-2**, and **Figure 5-3** show how to connect a pair of CDM-625/A modems together with the CRS-170A L-Band 1:1 Redundancy Switch module. The table included with each figure lists the items you will need from this kit for your initial setup.



CAUTION – It is **ESSENTIAL** that you make the control and the IF Rx and Tx connections correctly. See Sect. 5.3.1.1 for details about the CDM-625/A Modem-to-Switch Control Interface connection, and Sect. 5.3.1.2 for details about the CDM-625/A Modem-to-Switch IF Interface connections.

5.3.1.1 Modem-to-Switch Control Interface Connection

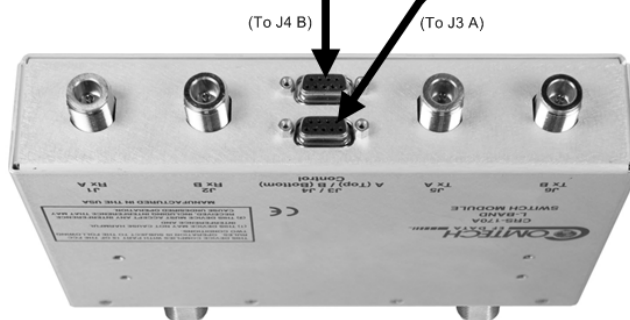


- 1) Excluding modems, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-1.
- 2) When you connect the Control Interface cables between the CRS-170A and the modems, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.

MODEM A



MODEM B



CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 5-1. CDM-625/A Modem-to-Switch Control Connections

5.3.1.2 Modem-to-Switch IF Interface Connection



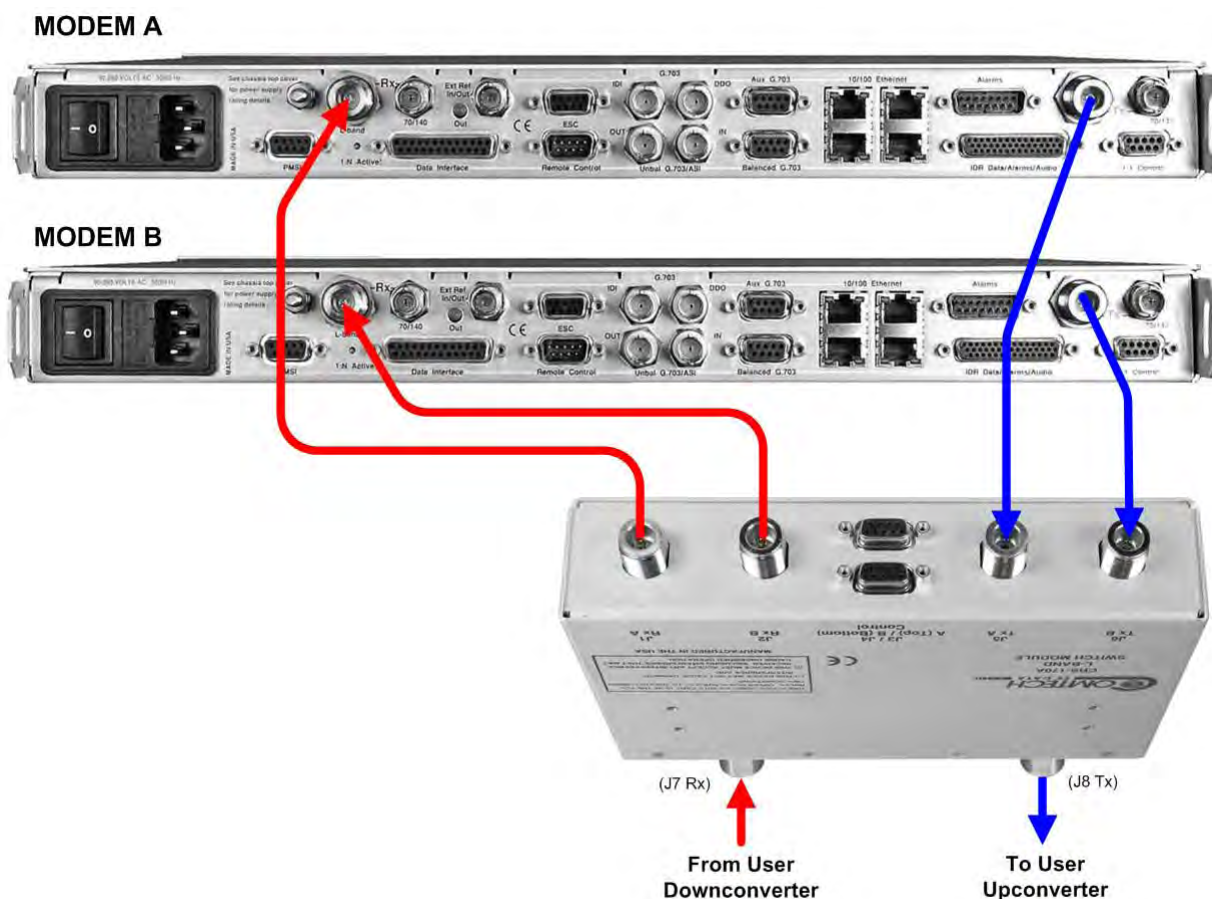
Excluding modems, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-2.



EXAMPLE: The Tx IF from 'MODEM A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'MODEM B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.

5.3.1.2.1 Modem-to-Switch L-Band (Rx/Tx) IF Interface Connection



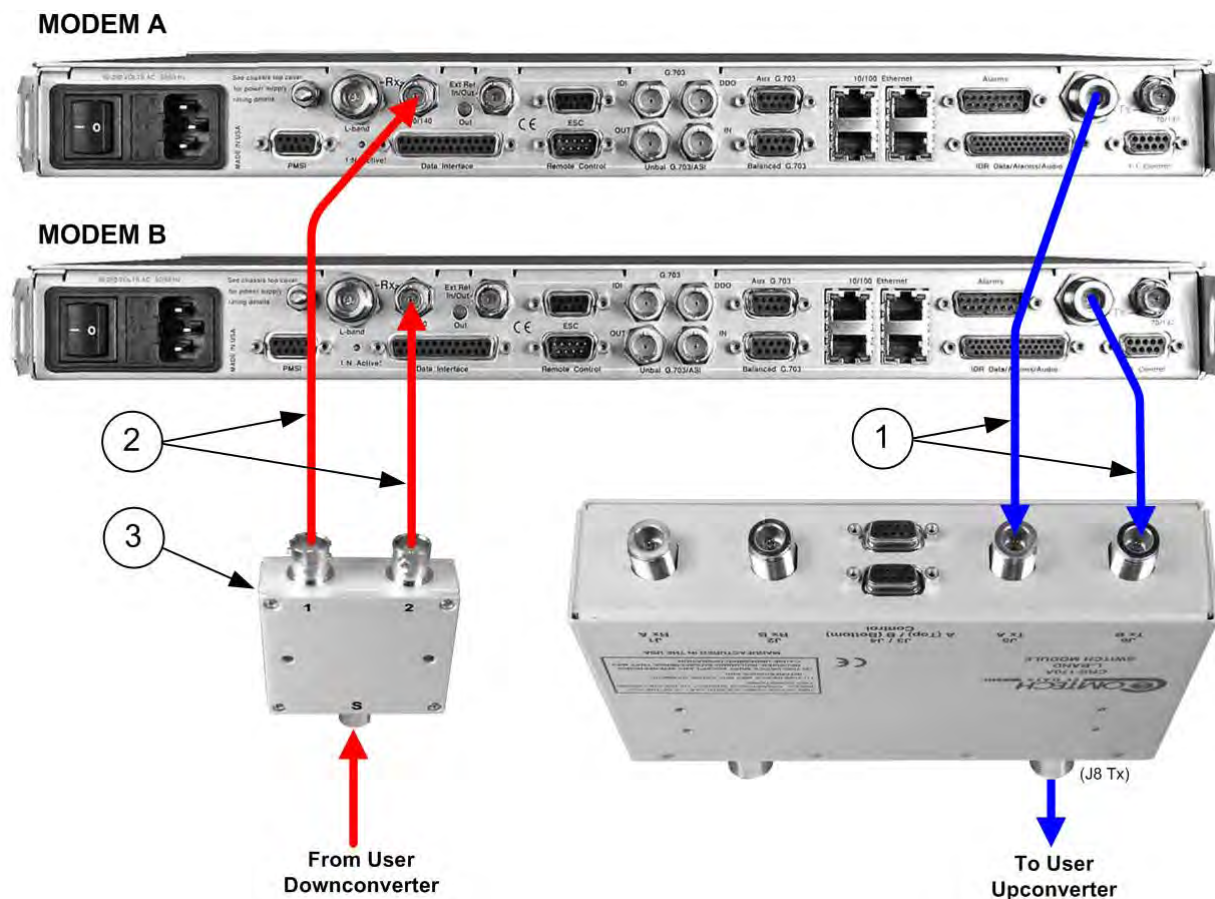
CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-2. CDM-625/A Modem-to-Switch L-Band IF Connections

5.3.1.2.2 Modem-to-Switch L-Band Tx / 70/140 MHz Rx IF Interface Connection



If the Tx IF is L-Band and the Rx IF is 70/140MHz, additional items may be purchased for this option, as shown here in Figure 5-3.



Item	CEFD Part No.	Qty	Description
1	CA/RF10453-4	2	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'
2	CA/BNC75OHM	2	Cable – IF Type 'BNC', 1'
3	RF/SA32KC-IN/OUT	1	Combiner – 2-way w/bracket, 0.25-300 MHz, 75Ω BNC

Figure 5-3. CDM-625/A Modem-to-Switch L-Band Tx / 70/140 MHz Rx IF Connections

5.3.2 Modem-to-User Data Interface Connections and Examples

5.3.2.1 Modem-to-User Non-IP Data Interface Connections and Examples



The data cables and components identified in each of the examples that follow in this section must be purchased separately, as required.

In addition to the control and IF Modem-to-Switch cabling shown previously, a number of data interface configurations are available for the CDM-625A and CDM-625 Advanced Satellite Modems. The **Figure 5-4** block diagram is typical for the examples shown in **Sects. 5.3.2.1.1** through **5.3.2.1.8**.

With the exception of the IP (10/100 Ethernet) Interface configurations shown in **Sect. 5.3.2.2** (which use customer-supplied Ethernet cables and Layer 2 switches), you must use one cabling and component kit per 1:1 modem pair for each user interface (see examples for specific quantities).

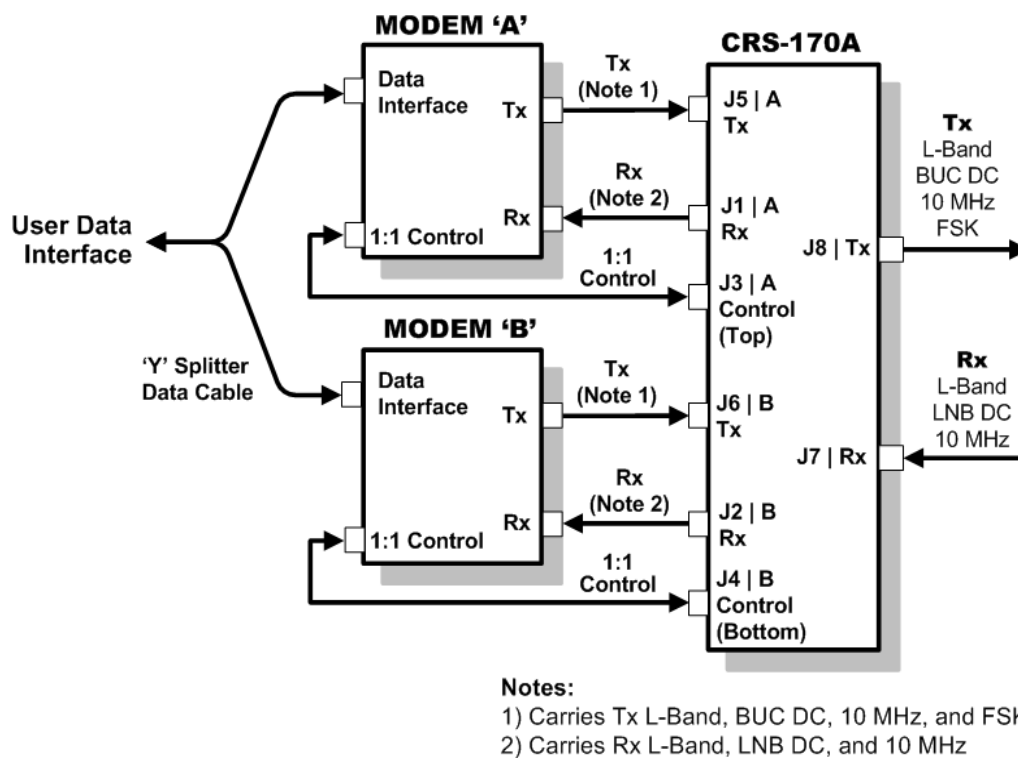


Figure 5-4. CDM-625/A Block Diagram – User→Modem→Switch→Traffic

5.3.2.1.1 EIA-422/232 Interface Example

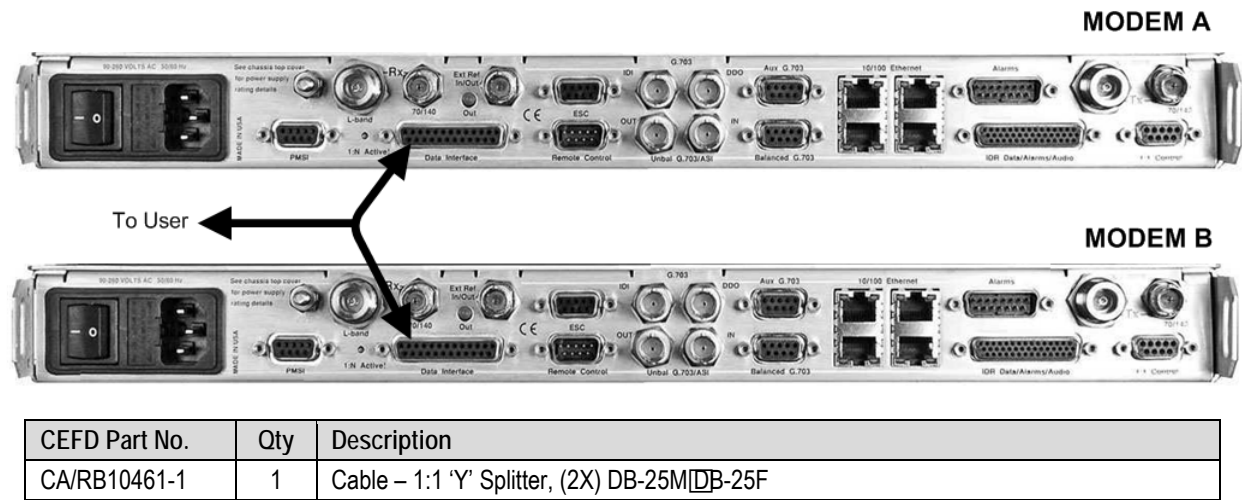


Figure 5-5. CDM-625/A EIA-422/232 1:1 Example

5.3.2.1.2 HSSI Interface Example

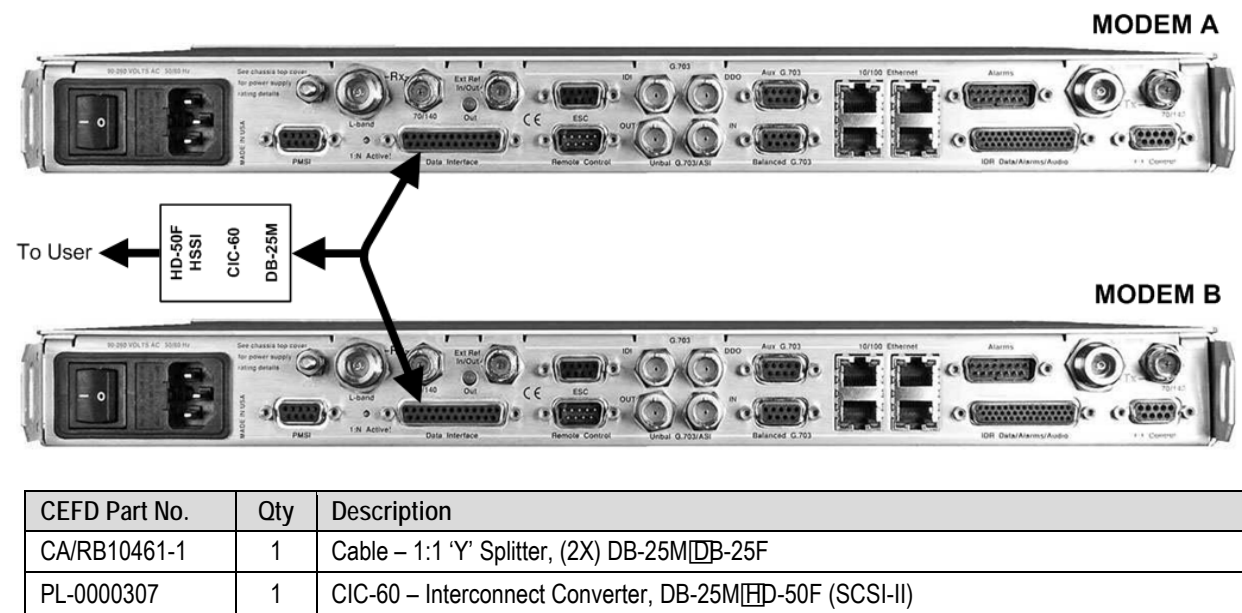


Figure 5-6. CDM-625/A HSSI 1:1 Example

5.3.2.1.3 Quad E1 Interface Example

Use the individual G.703 Balanced and Auxiliary G.703 DB-9F connectors for Quad E1 operation.



- 1) As shown in Figure 5-7, the CA-0000071 'Y' Cable provides for two ports of E1 (i.e., Ports 1/2 -or- Ports 3/4).
- 2) If you desires three or four *separate* ports of E1 (i.e., Port 1 *and* Port 2 -or- Port 3 *and* Port 4), then optional adapter cables may be purchased from Comtech EF Data to adapt the G.703 Balanced and Auxiliary G.703 DB-9F single connector pairs to outgoing Quad E1 connector pairs as follows:

Cable CEFD P/N	Converts (1) 9-pin Type 'D' (DB-9F) paired connection (e.g., Modem A <u>AND</u> Modem B G.703 Balanced connector pair -or- Modem A <u>AND</u> Modem B Auxiliary G.703 connector pair) to:	See App. A Fig.
CA-0000163	(2) 15-pin Type 'D' (DB-15F) connectors	A-11
CA-0000164	(2) RJ-48 female connectors	A-12
KT-0000122	(4) BNC 75Ω female connectors – (2) Tx, (2) Rx	A-13

All three cabling options plug into the single 'To User' connector side of each CA-0000071 'Y' Splitter cable used.

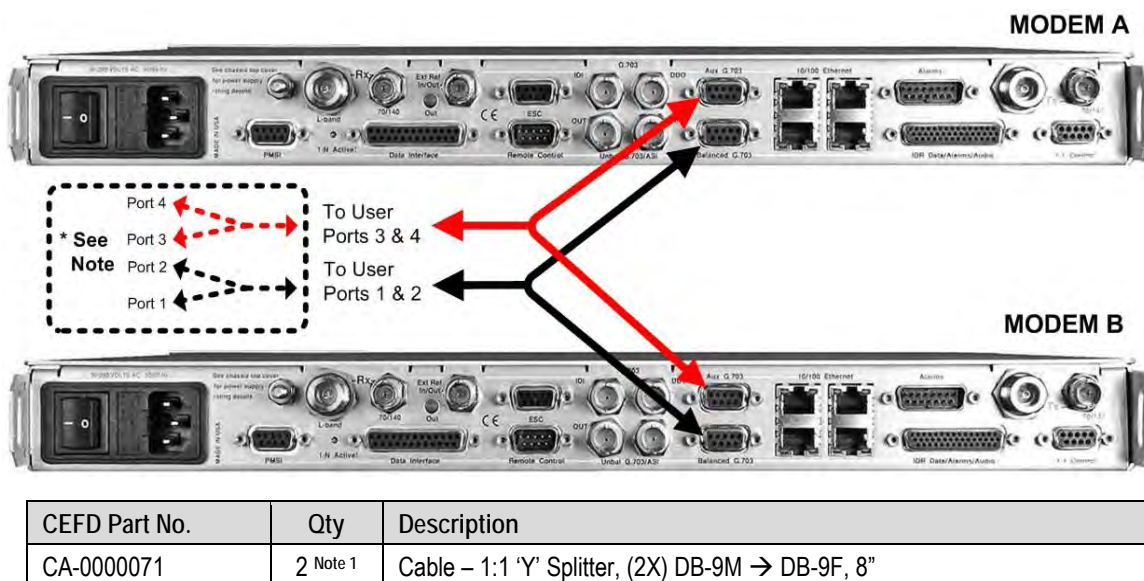


Figure 5-7. CDM-625/A Quad E1 1:1 Example

5.3.2.1.4 G.703 Balanced Interface Example

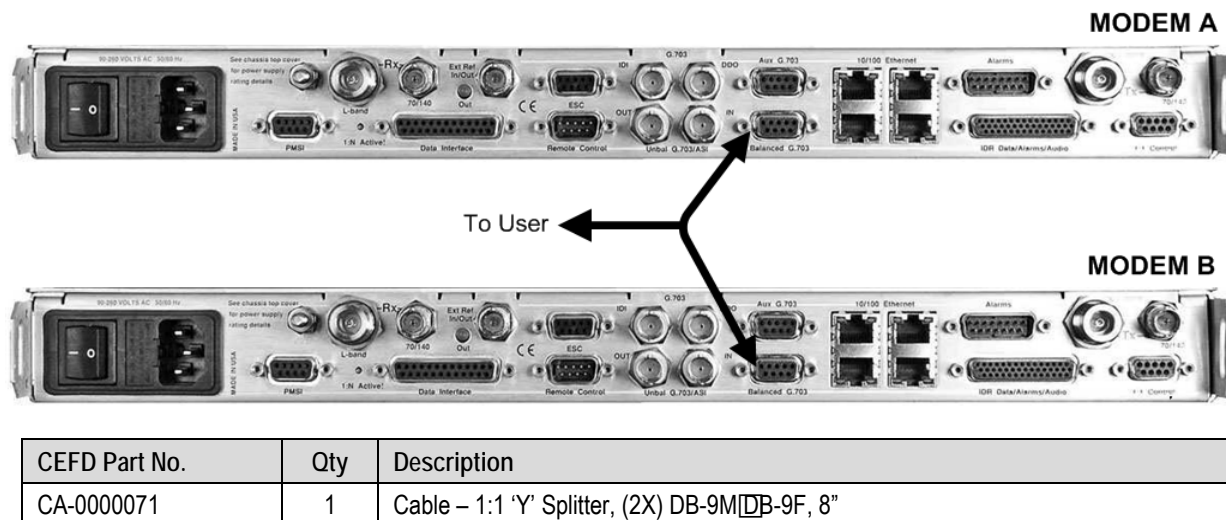


Figure 5-8. CDM-625/A G.703 Balanced 1:1 Example

5.3.2.1.5 G.703 Unbalanced Interface Example

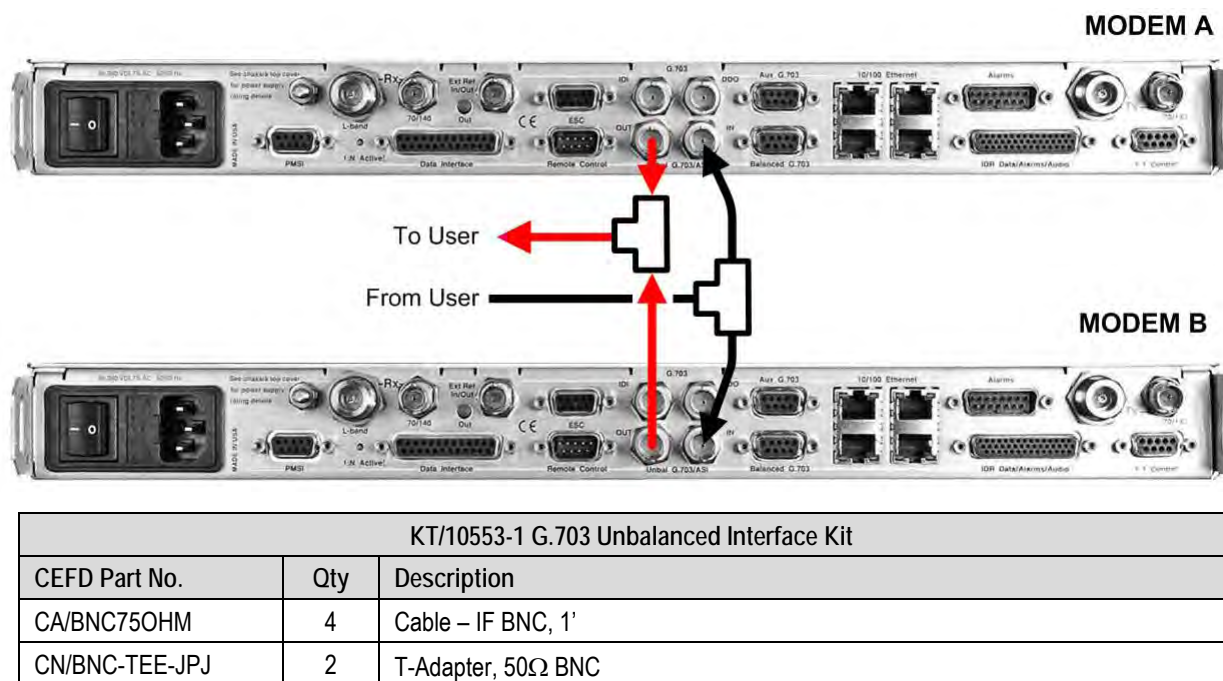
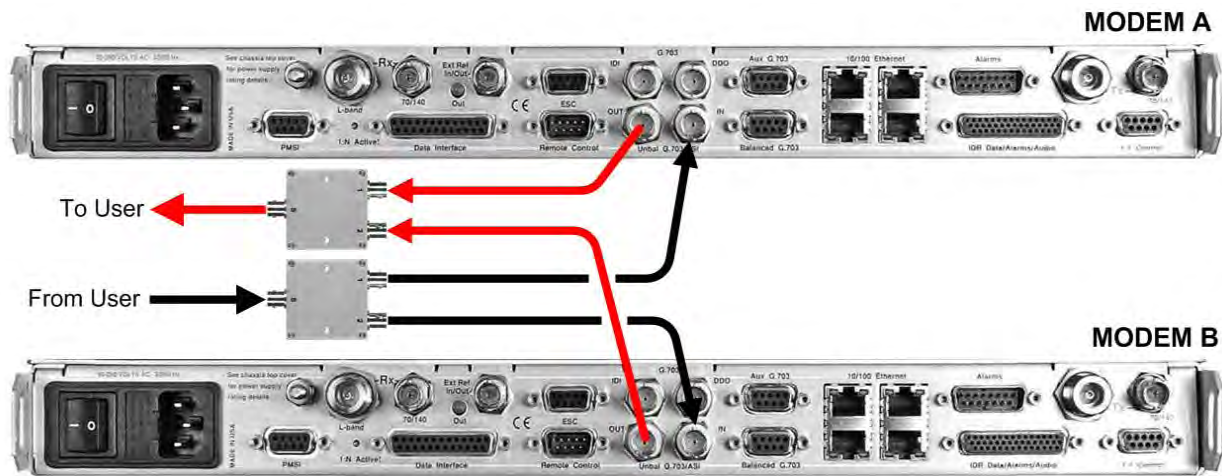


Figure 5-9. CDM-625/A G.703 Unbalanced 1:1 Example

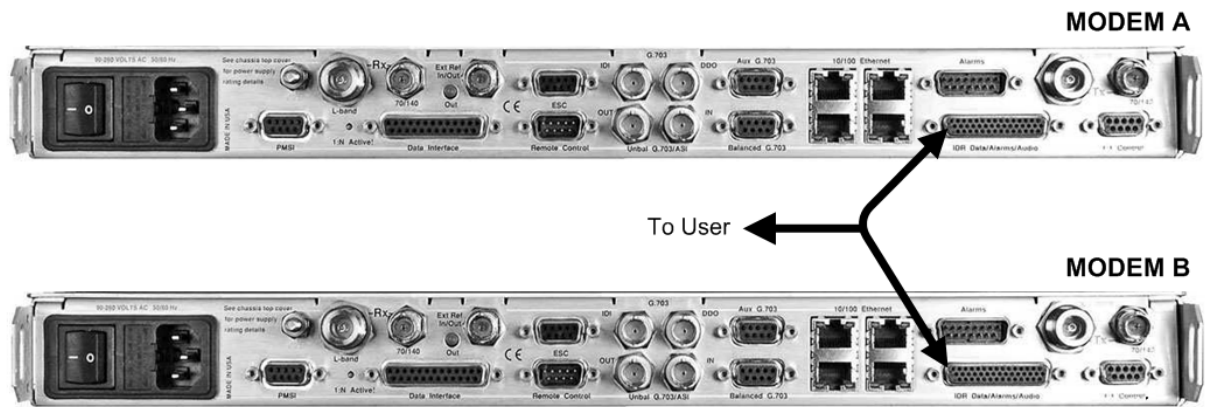
5.3.2.1.6 ASI Interface Example



KT/12579 ASI 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 5-10. CDM-625/A ASI 1:1 Example

5.3.2.1.7 Overhead Interface Example



CEFD Part No.	Qty	Description
CA-0000070	1	Cable – 1:1 ‘Y’ Splitter, (2X) HD-44M□D-44F, 8”

Figure 5-11. CDM-625/A Overhead 1:1 Example

5.3.2.1.8 Engineering Service Channel (ESC) Interface Example

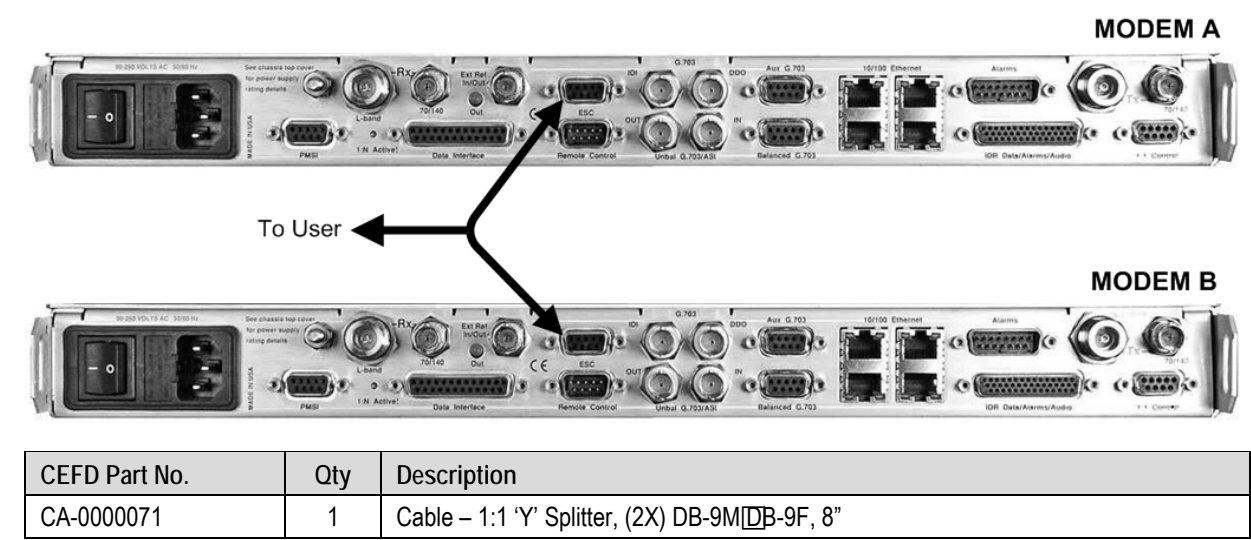


Figure 5-12. CDM-625/A ESC 1:1 Example

5.3.2.2 Modem-to-User IP (10/100 Ethernet) Interface Examples

5.3.2.2.1 Data Interface Connections Using IP Sub-Mux



- Chapter 15. IP SUB-MUX in CDM-625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625)
- Appendix N. IP SUB-MUX in CDM-625A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A)

Subsystem Multiplex – referred to by CEFD as Sub-Mux – is a secondary framing structure that combines one to four ports of IP (10/100 Ethernet) traffic (see **Figure 5-13**) with any currently available combination of framing and interface type (see **Figure 5-5** through **Figure 5-12**) – excluding IP itself. The composite data rate to the modulator and from the demodulator is referenced to the primary, non-IP data interface rate by a specific user-selected ratio.

5.3.2.2.2 Managed Switch Mode (with/without the Optional IP Packet Processor)

Figure 5-13 shows the block diagram for the CDM-625/A 1:1 modem configuration using the IP (10/100 Ethernet) Interface in Managed Switch (Ethernet Bridge) Mode. **Figure 5-14** shows the cabling example for this setup.

This configuration requires no cabling kit – you must use user-provided Ethernet cables and Layer 2 switches for direct connection to the modem via **one to four** RJ-45 ports. This cabling example shows use of all four Ethernet ports.



- 1) When in Managed Switch Mode with the Packet Processor either not installed or installed but disabled, all Ethernet ports on the Offline modem will be disabled. The exception is if one of the ports has been set to be the Dedicated Management Port.

See the CDM-625A or CDM625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A or MN-CDM625) for instructions on configuring one of the four 10/100 Ethernet ports as the Dedicated Management Port for remote Ethernet M&C (Dedicated Management Port is available only without the optional IP Packet Processor).

- 2) When in Managed Switch Mode with the optional IP Packet Processor installed and enabled, only Port 1 of the Offline modem is enabled, while Ports 2, 3, and 4 on the Offline modem are disabled.
- 3) TO AVOID ETHERNET NETWORKING LOOPS – When in Managed Switch Mode and using more than one Ethernet port, the ports must not be connected to the same Layer 2 Switch unless they are isolated from one another. The ports can be isolated by connecting each port to a separate Layer 2 Switch (see **Figure 5-13**), or by configuring separate VLAN's for each port on a single Layer 2 Switch.

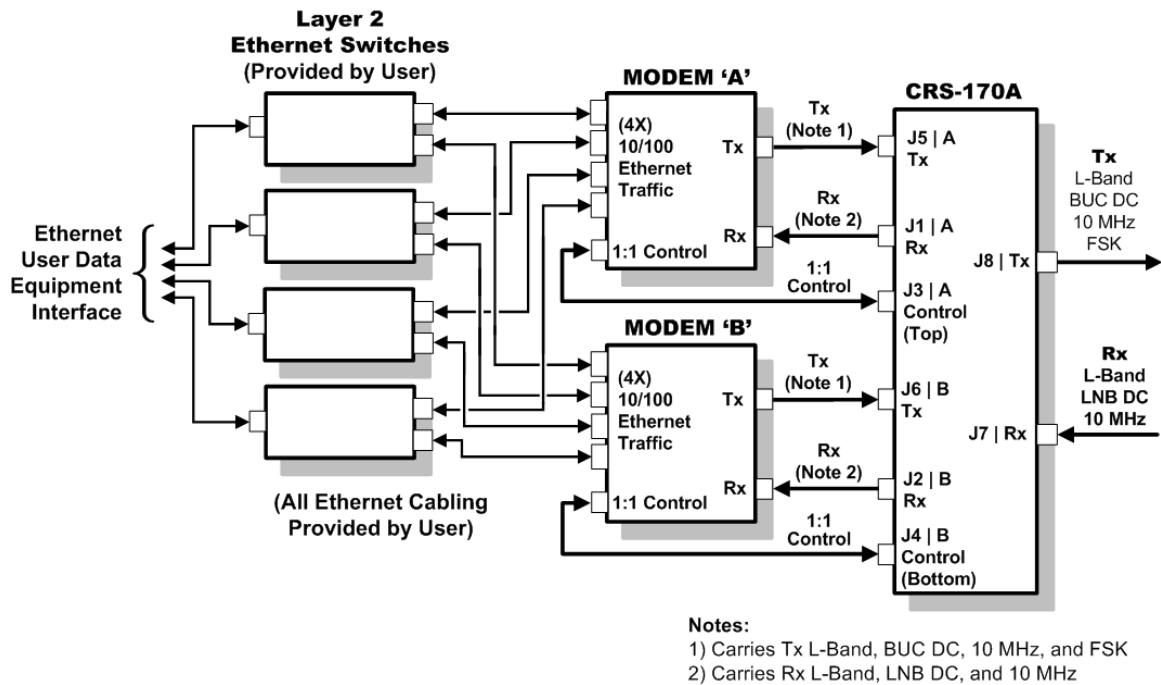


Figure 5-13. CDM-625/A Block Diagram – 10/100 Ethernet 1:1 Managed Switch Mode

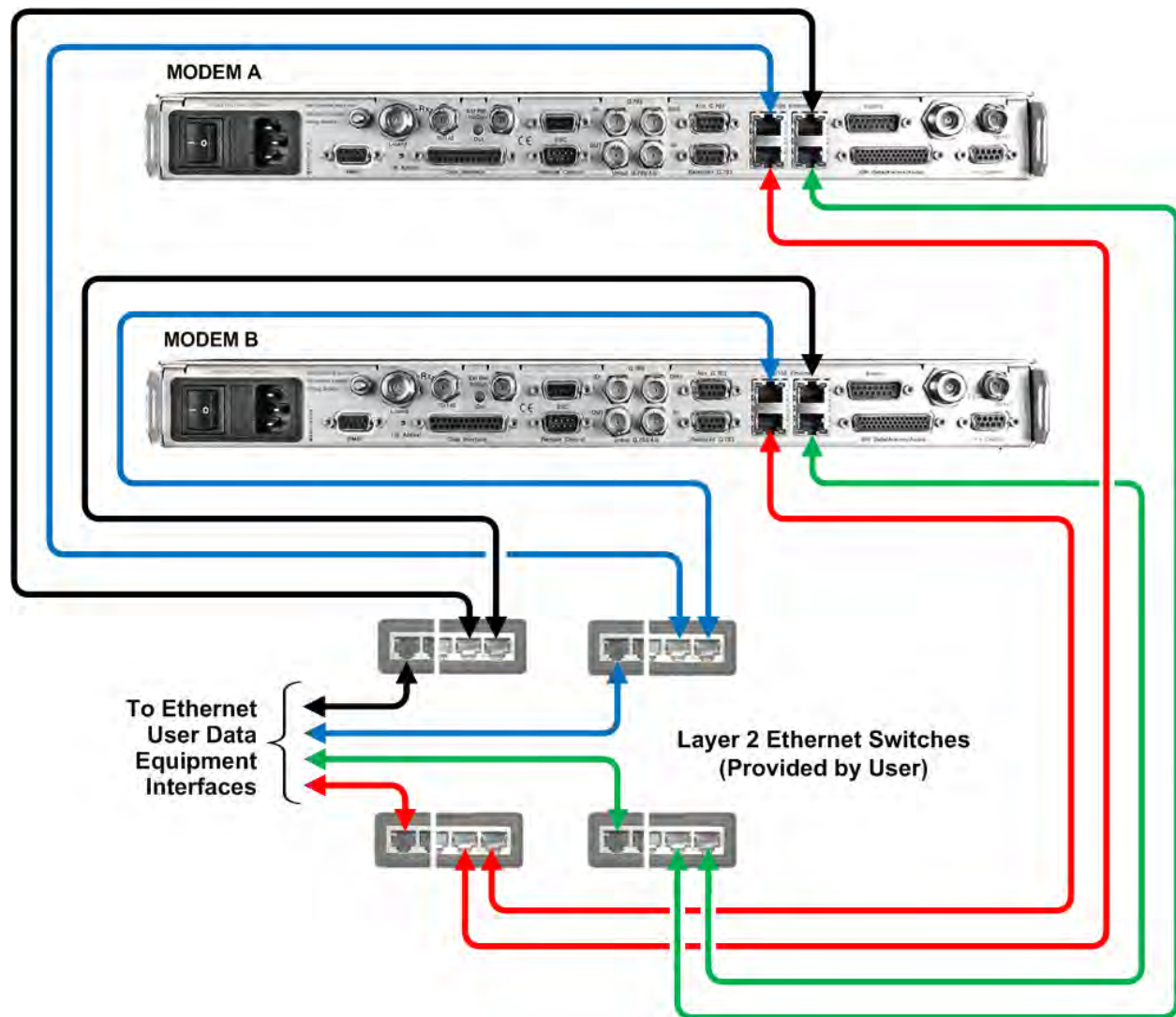


Figure 5-14. CDM-625/A 10/100 Ethernet 1:1 Cabling Example – Managed Switch Mode (with/without Dedicated Management Port)

5.3.2.2.3 Router Mode (Requires Optional IP Packet Processor)



When the optional IP Packet Processor is installed and enabled, you should use Port 1 of each modem for M&C purposes only. Reserve use of Port 2, 3, or 4 for each modem for Ethernet traffic only.

TO AVOID ETHERNET NETWORKING LOOPS – Make sure to connect Port 1 (M&C) and the designated Traffic Port to separate Layer 2 Switches, unless your Layer 2 Switch is configured to isolate these ports by using VLANs.

Figure 5-15 shows the block diagram for a CDM-625/A 1:1 modem configuration using the IP (10/100 Ethernet) Interface in Router Mode, with the optional IP Packet Processor installed and enabled. The Figure 5-16 cabling example shows Ethernet Port 2 as the designated Ethernet traffic connection.

This configuration requires no cabling kit – you must use user-provided Ethernet cables and Layer 2 switch(es) for direct connection to the modem.

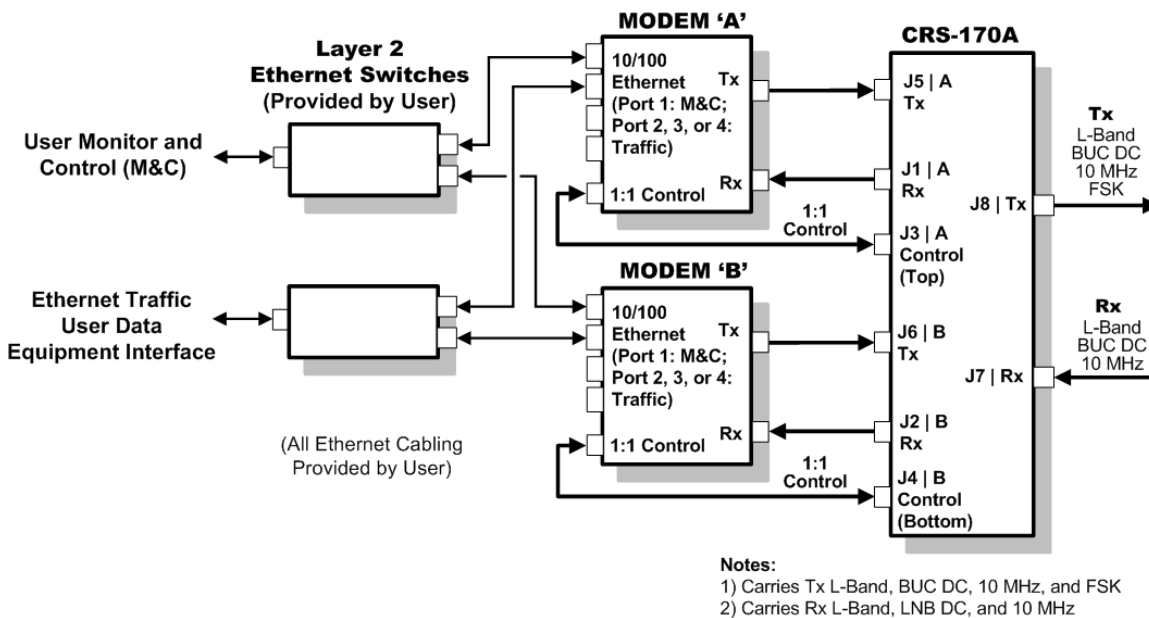


Figure 5-15. CDM-625/A 10/100 Ethernet 1:1 Example – Router Mode Block Diagram

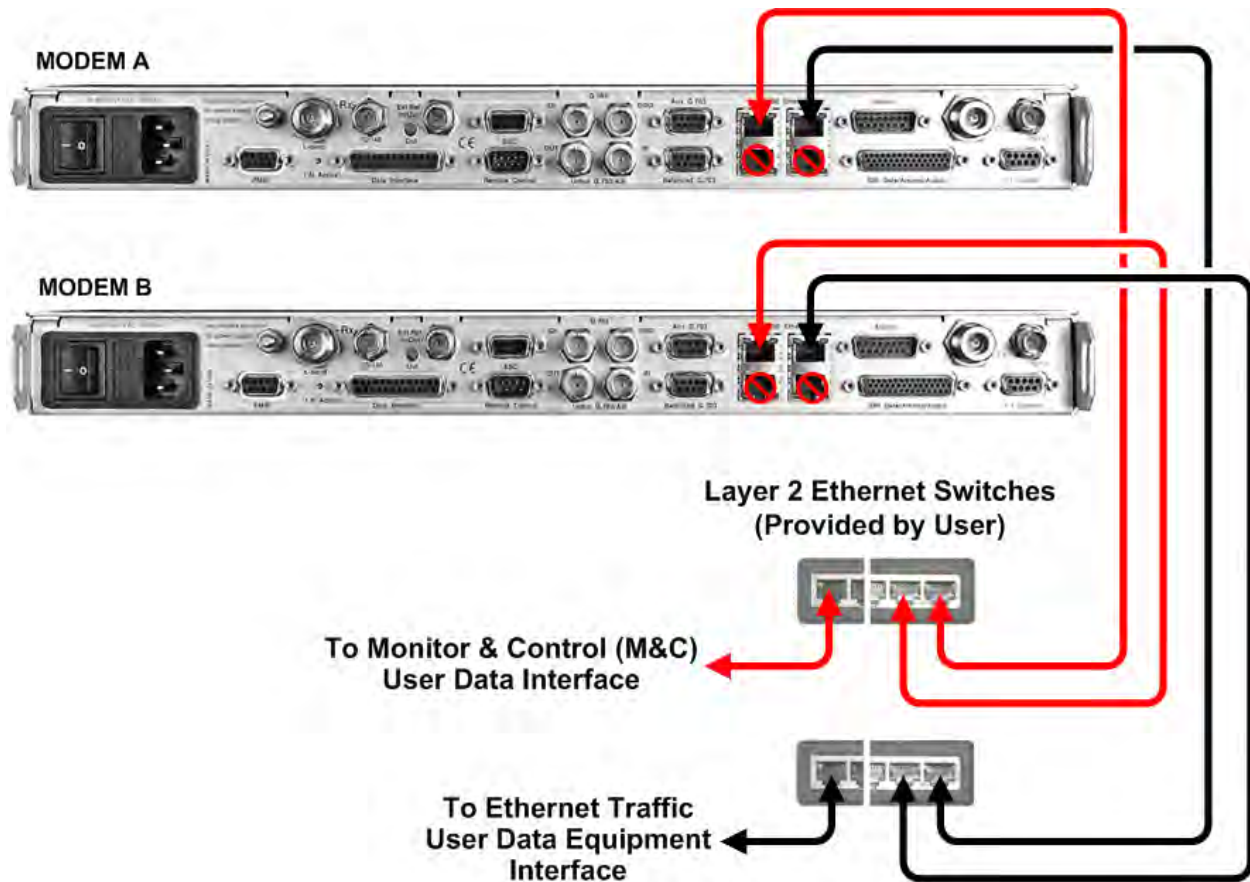


Figure 5-16. CDM-625/A 10/100 Ethernet 1:1 Cabling Example – Router Mode

5.3.2.3 PMSI Interface Example

The **Pre-Mapped Symbol Interface (PMSI)** is an EIA-485 point-to-point bus system where one device transmits, and the other device on the bus is configured to receive. It is a function associated with DoubleTalk® Carrier-in-Carrier® (CnC®) that permits the modulator in a selected unit to provide a direct copy of its output (the outbound interferer) to the Offline modem in a 1:1 pair. The Offline modem then takes the PMSI signal and uses it for its own CnC® reference.

You must take specific configuration steps to enable CnC® in your CDM-625/A 1:1 pair before you can make any switch configurations, This ensures proper operation of the pair within a configured CRS-170A 1:1 Redundancy System.



Chapter 4. MODEM AND SWITCH CONFIGURATION

Use of PMSI requires that you connect and secure the CDM-625/A Multi-drop CnC® Plus 1:1 Cable CA-0000276 (2X DB-9M, 1') between the Redundant Modem and the Traffic Modem using CnC. See Figure 5-17.



The CA-0000276 Multi-Drop CnC PLUS 1:1 Cable bypasses the CRS-170A L-Band 1:1 Redundancy Switch.



CEFD Part No.	Qty	Description
CA-0000276	1	CDM-625/A Data Cable – Shielded, Multi-drop CnC® Plus, 1:1, (2X) DB-9M, 1'

Figure 5-17. CDM-625/A PMSI 1:1 Example

5.4 Cabling to the CDM-850



- 1) For information on the CDM-850's 1:1 auto-enable functionality, see:
 - Chapter 4. MODEM AND SWITCH CONFIGURATION
 - CDM-850 Remote Router Installation and Operation Manual (CEFD Part No. MN-CDM850)
- 2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.4.1 CRS-170A → CDM-850 Control and IF Interface Connections Using Cabling Kit KT-0000160



The CDM-850 employs 10/100/1000 Ethernet (Gigabit Ethernet, also referred to throughout this chapter as GigE or GbE) as its sole terrestrial data interface. All cables and switches must be user-supplied. See Sect. 5.4.2 for the CDM-850 Gigabit Ethernet terrestrial data interface configuration and connection examples and details.

You must use Comtech EF Data's KT-0000160 1:1 Redundancy Control/IF Interface Cabling Kit (Sect. 5.2.1) for your control and L-Band Unit-to-Switch cabling connections. **Figure 5-18** and **Figure 5-19** show how to connect a pair of CDM-850s together with the CRS-170A L-Band 1:1 Redundancy Switch module. The table included with each figure lists the items you will need from this kit for your initial setup.



CAUTION – It is **ESSENTIAL** that you make the control and the IF Rx and Tx connections correctly. See Sect. 5.4.1.1 for details about the CDM-850 Unit-to-Switch Control Interface connection, and Sect. 5.4.1.2 for details about the CDM-850 Unit-to-Switch IF Interface connections.

5.4.1.1 Unit-to-Switch Control Interface Connection



- 1) Excluding the CDM-850s, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-18.
- 2) When you connect the Control Interface cables between the CRS-170A and the CDM-850s, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 5-18. CDM-850 Unit-to-Switch Control Connections

5.4.1.2 Unit-to-Switch IF Interface Connection

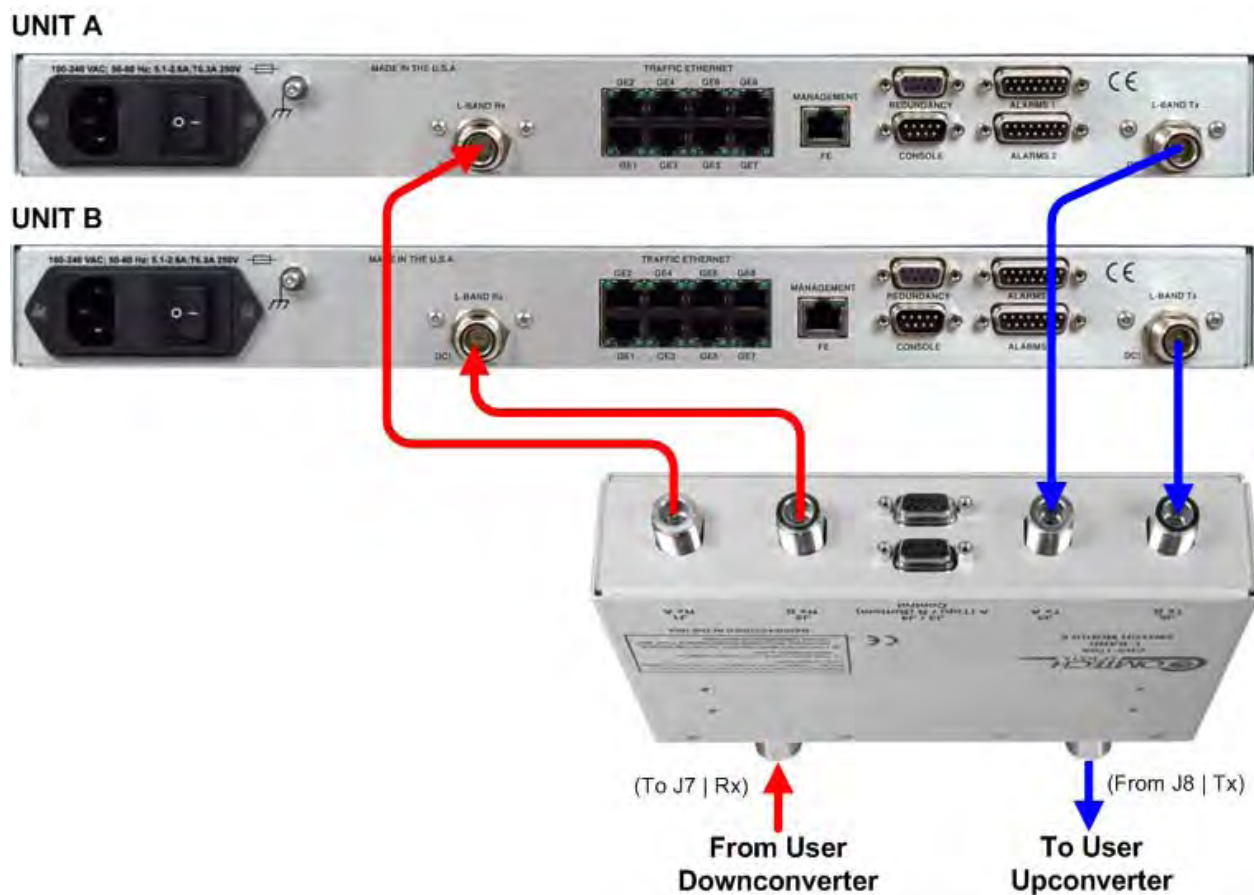


Excluding the CDM-850s, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-19.



EXAMPLE: The Tx IF from 'Unit A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'Unit B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-19. CDM-850 Unit-to-Switch L-Band IF Connections

5.4.2 Unit-to-User Data Interface Connections and Examples

In addition to the control and IF Unit-to-Switch cabling shown previously, the CDM-850 features an eight-port 10/100/1000 Gigabit Ethernet data interface.

5.4.2.1 CDM-850 Managed Switch (Ethernet Bridge) Mode

Figure 5-20 shows the block diagram for a CDM-850 1:1 redundant configuration in Managed Switch (Ethernet Bridge) Mode. **Figure 5-21** shows the cabling example for this setup. This configuration requires no cabling kit – you must use user-provided Ethernet cables and Layer 2 switches for direct connection to the modem via **one to eight** RJ-45 ports. Both figures depict all eight ports used.

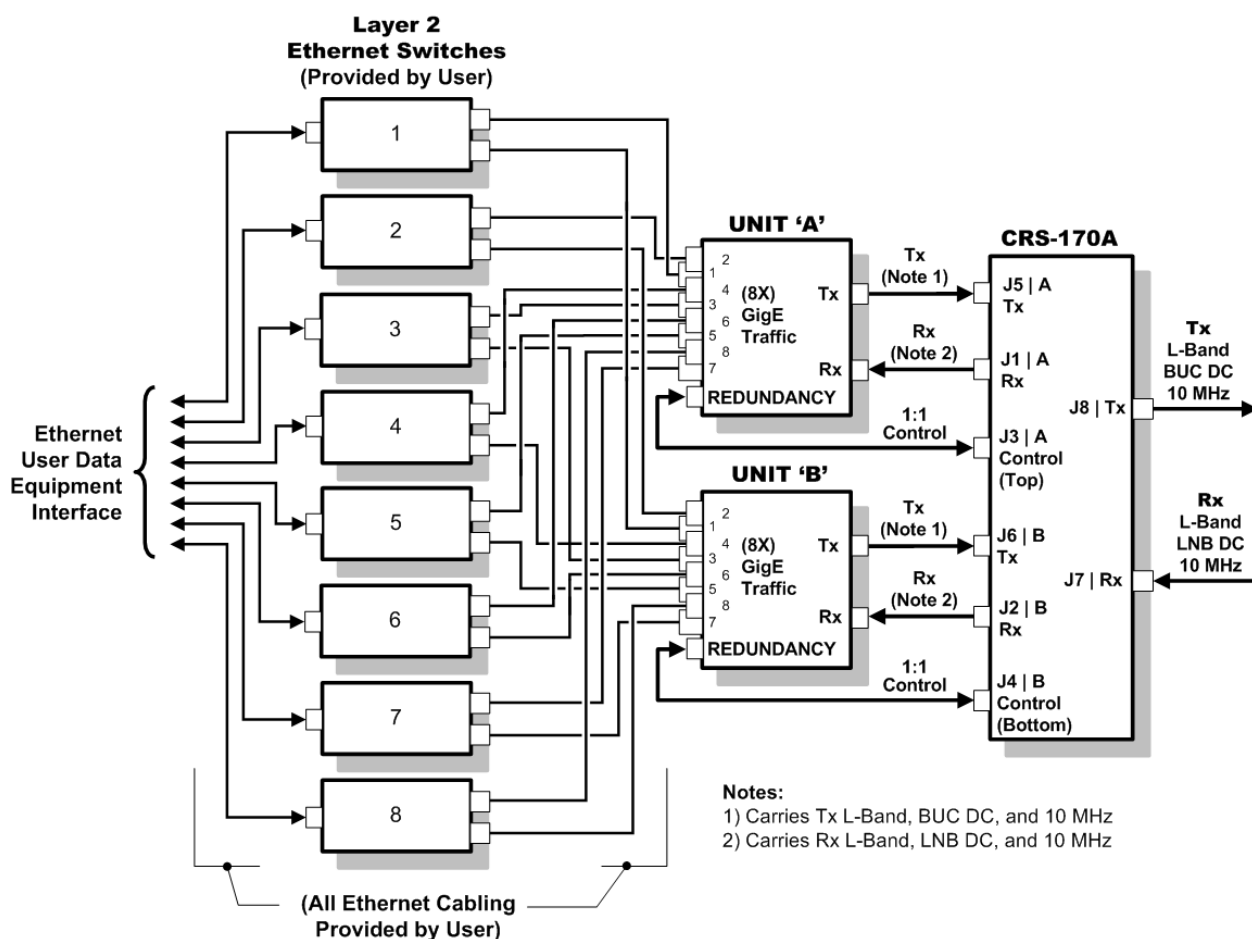


Figure 5-20. CDM-850 Block Diagram –Gigabit Ethernet 1:1 Managed Switch Mode

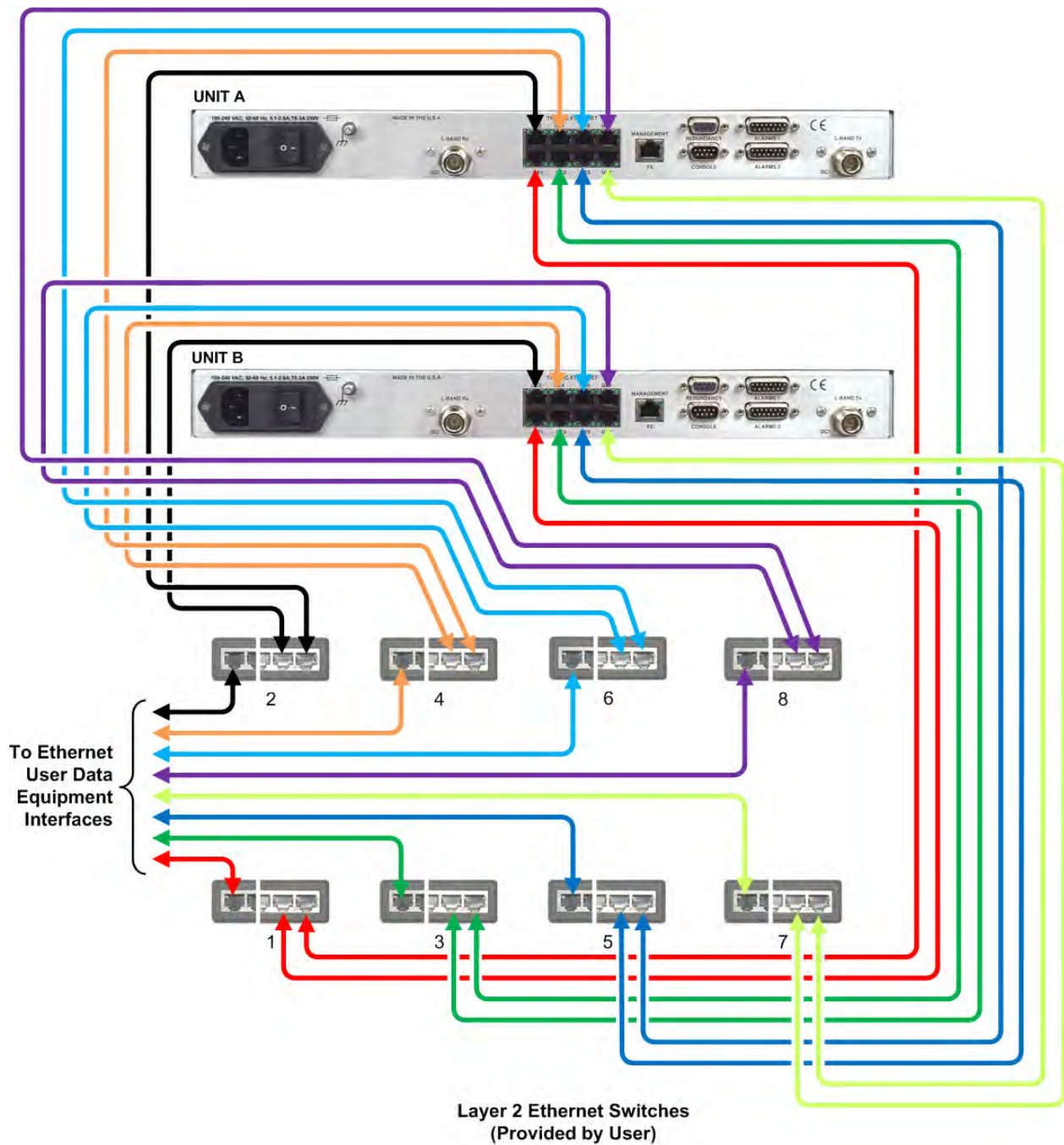
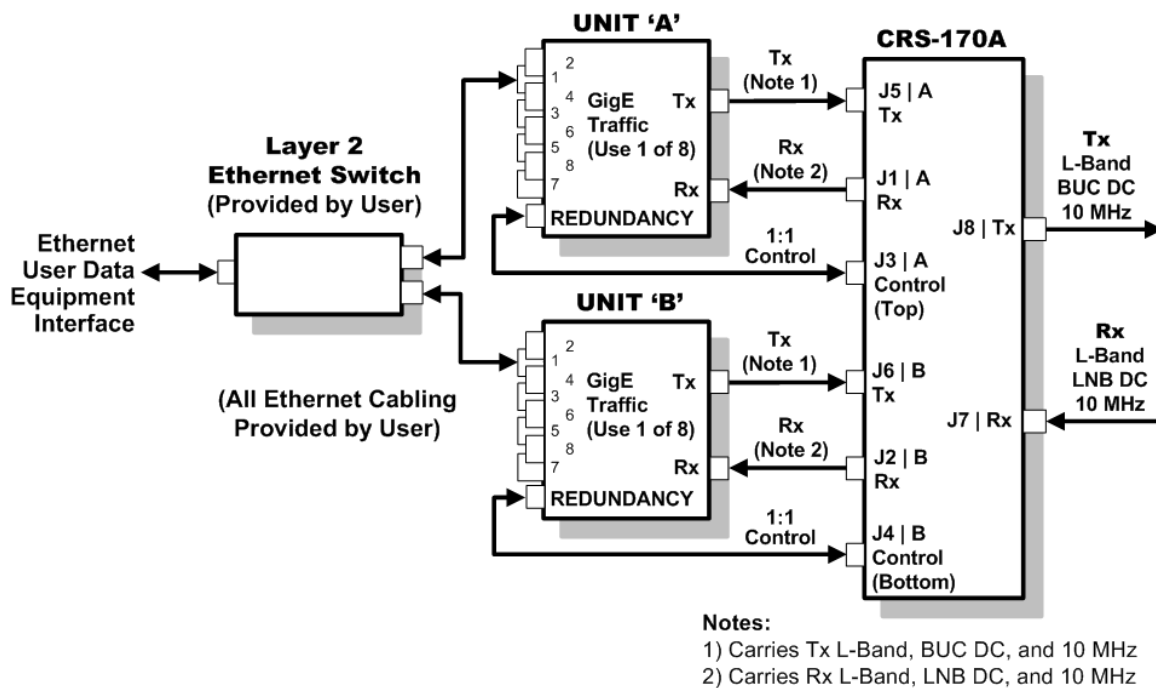


Figure 5-21. CDM-850 Gigabit Ethernet 1:1 Cabling Example – Managed Switch Mode

5.4.2.2 CDM-850 Router Mode

Figure 5-22 shows the block diagram and cabling example for a CDM-850 1:1 redundant configuration using the Gigabit Ethernet Interface in Router Mode. This configuration requires no cabling kit – you must use user-provided Ethernet cables and Layer 2 switch for direct connection to the modem via **only one of eight** RJ-45 ports. Both details depict the use of Port ‘GE1’.



CDM-850 Block Diagram – Gigabit Ethernet 1:1 Router Mode

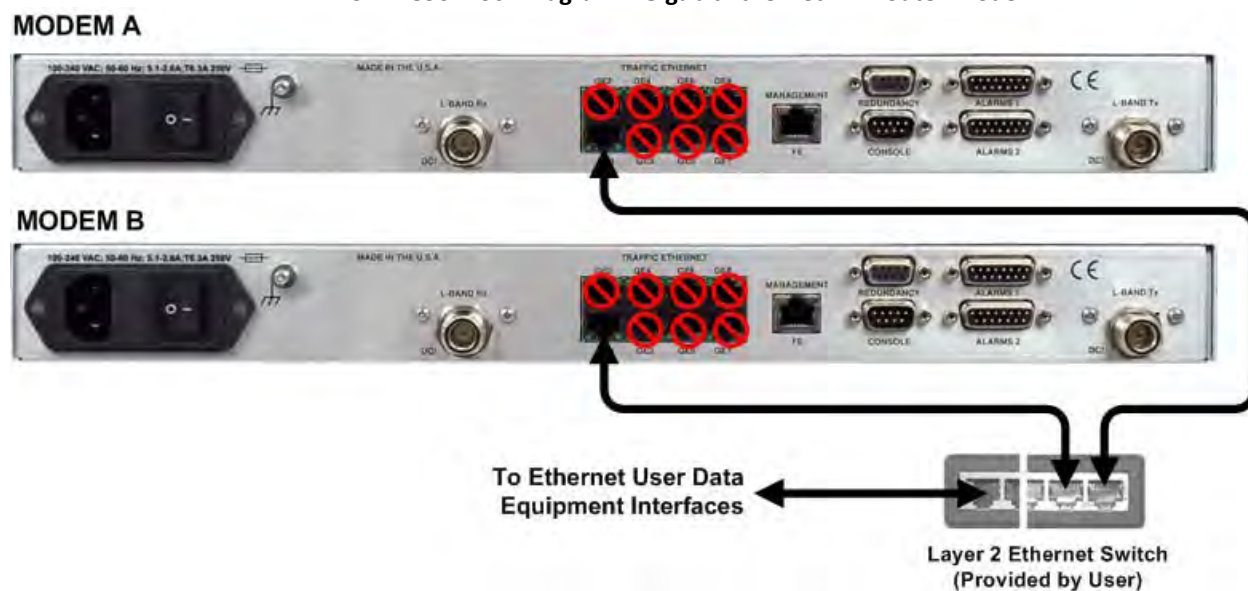


Figure 5-22. CDM-850 Gigabit Ethernet 1:1 Cabling Example – Router Mode

5.5 Cabling to the CDM-840



- 1) For information on the CDM-840's 1:1 auto-enable functionality, see:
 - Chapter 3. MODEM AND SWITCH CONFIGURATION
 - CDM-840 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM840)
- 2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.5.1 CRS-170A → CDM-840 Control and IF Interface Connections Using Cabling Kit KT-0000160



You must order terrestrial data interface components/kits separately. See Sect. 5.5.2 for CDM-840 terrestrial data interface configuration and connection examples and details.

You must use Comtech EF Data's KT-0000160 1:1 Redundancy Control/IF Interface Cabling Kit (Sect. 5.2.1) for your control and L-Band Unit-to-Switch cabling connections. **Figure 5-23** and **Figure 5-24** show how to connect a pair of CDM-840s together with the CRS-170A L-Band 1:1 Redundancy Switch module. The table included with each figure lists the items you will need from this kit for your initial setup.

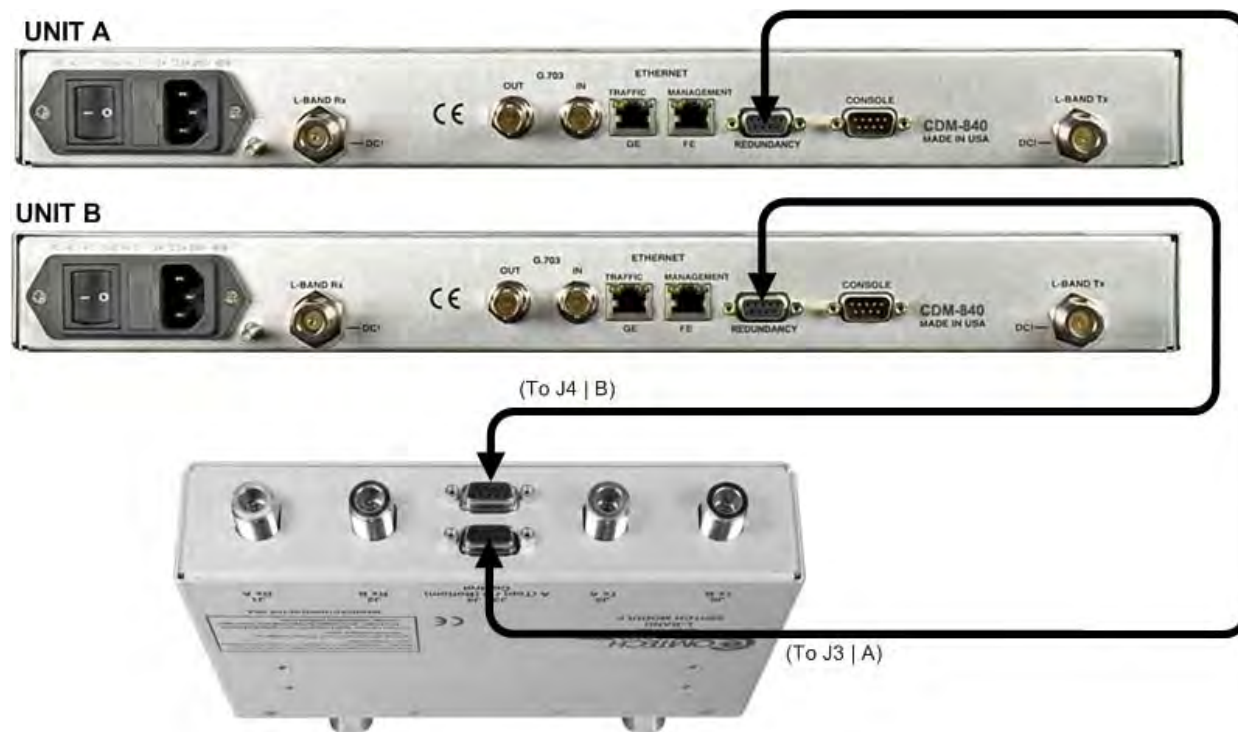


CAUTION – It is **ESSENTIAL** that you make the control and the IF Rx and Tx connections correctly. See Sect. 5.5.1.1 for details about the CDM-840 Unit-to-Switch Control Interface connection, and Sect. 5.5.1.2 for details about the CDM-840 Unit-to-Switch IF Interface connections.

5.5.1.1 Unit-to-Switch Control Interface Connection



- 1) Excluding the CDM-840s, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-23.
- 2) When you connect the Control Interface cables between the CRS-170A and the CDM-840s, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 5-23. CDM-840 Unit-to-Switch Control Connections

5.5.1.2 Unit-to-Switch IF Interface Connection

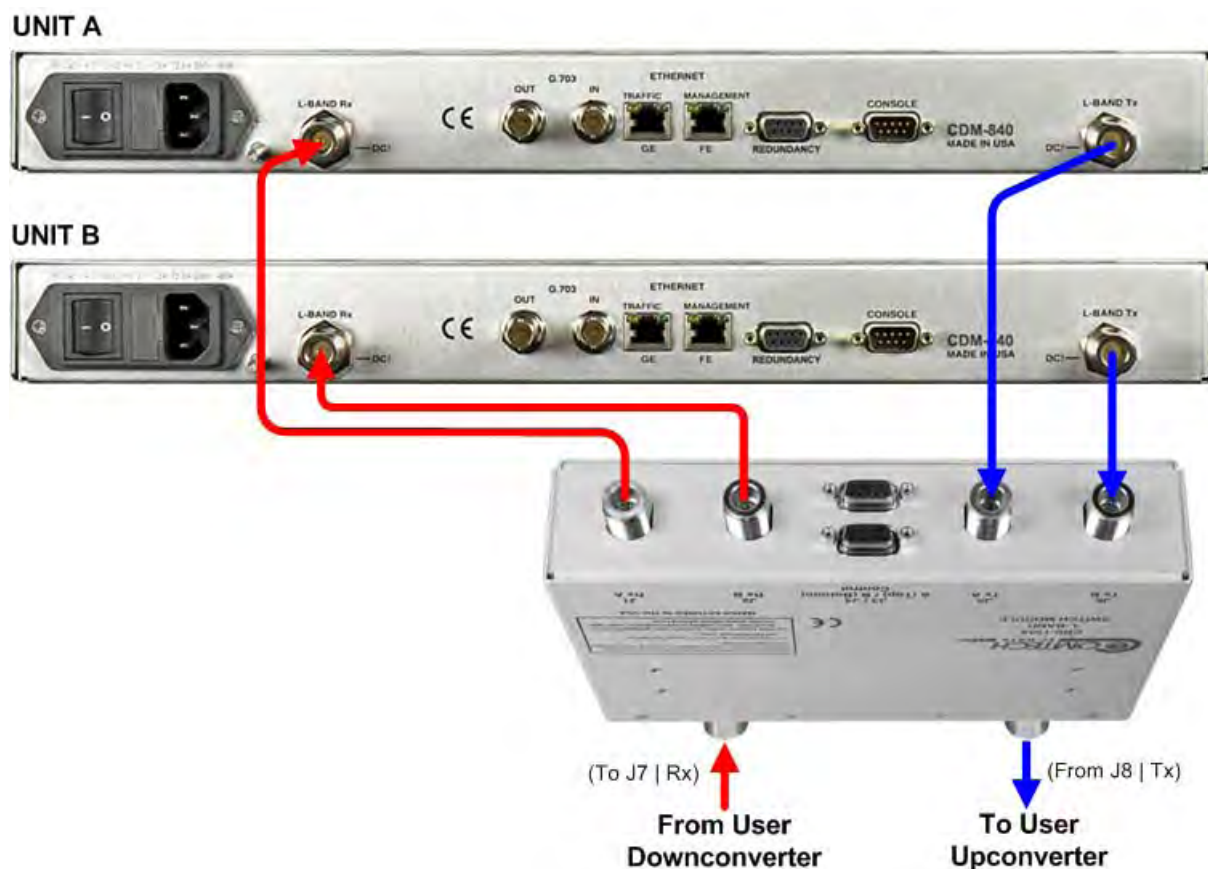


Excluding the CDM-840s, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-24.



EXAMPLE: The Tx IF from 'Unit A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'Unit B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-24. CDM-840 Unit-to-Switch L-Band IF Connections

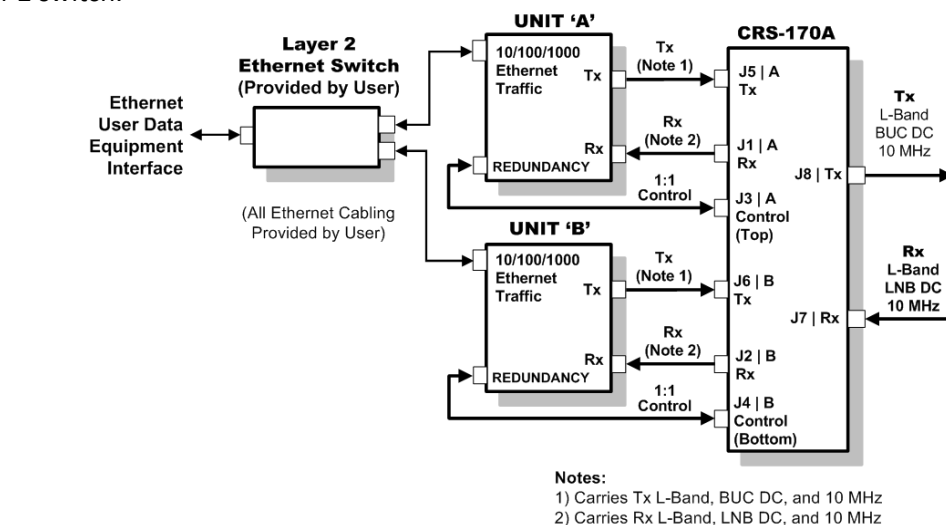
5.5.2 Unit-to-User Data Interface Connections and Examples

In addition to the control and IF Unit-to-Switch cabling shown previously, the CDM-840 features a single 10/100/1000 Gigabit Ethernet RJ-45 data interface port, and a G.703 Unbalanced E1 data interface for use with the CDM-840's optional E1 Interface/RAN Optimization Hardware/FAST Feature upgrade.

With the exception of the 10/100/1000 Gigabit Ethernet Interface configuration shown in **Sect. 5.5.2.1**, which requires user-provided Ethernet cables and a Layer 2 switch, you will need one cable and component kit per 1:1 unit pair for each user interface (see examples for specified quantities).

5.5.2.1 RJ-45 Gigabit Ethernet Data Interface Example

Figure 5-25 shows the block diagram and cabling example for a CDM-840 1:1 configuration using the RJ-45 10/100/1000 Gigabit Ethernet port. This configuration requires no cabling and component kit – you must make a direct connection with user-provided Ethernet cables and a Layer 2 switch.



CDM-840 Block Diagram – Gigabit Ethernet 1:1 Operation

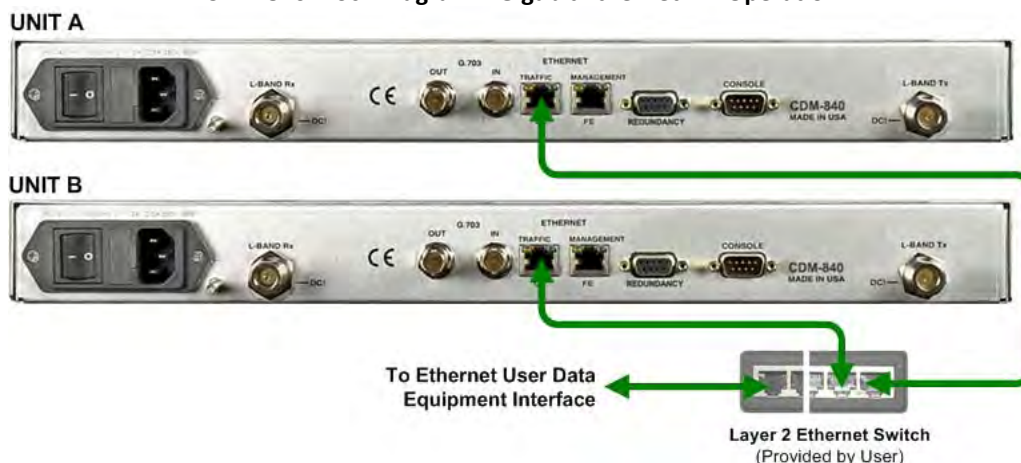
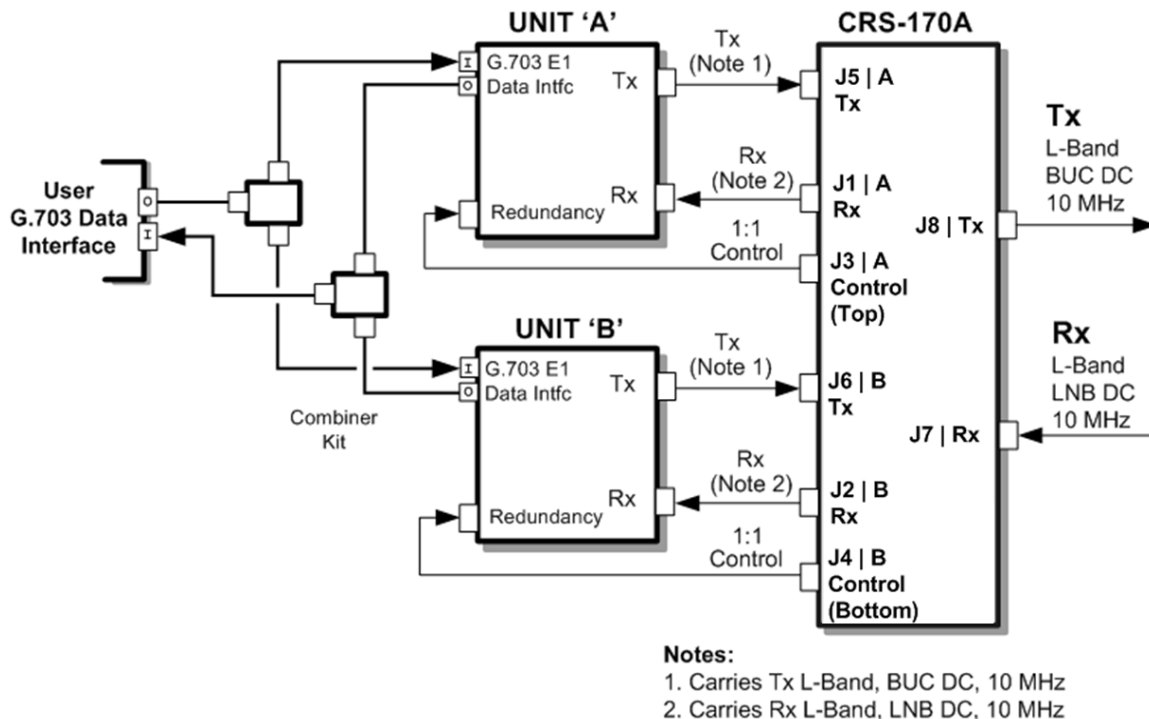


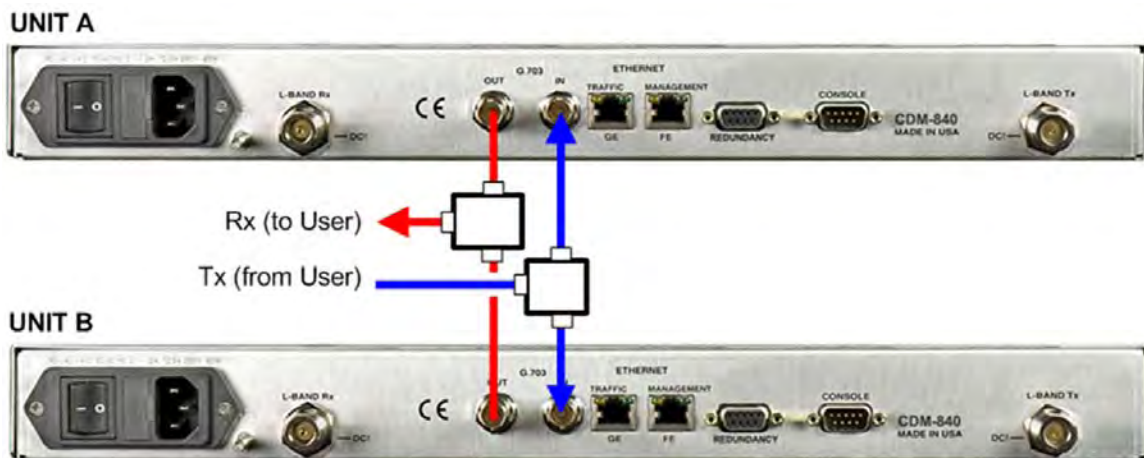
Figure 5-25. CDM-840 Block Diagram – Gigabit Ethernet 1:1 Operation

5.5.2.2 KT/12542 G.703 75Ω Data Interface Kit (for G.703 Unbalanced E1)

Figure 5-26 shows the block diagram and a cabling example for a CDM-840 1:1 configuration for the G.703 Unbalanced E1 data interface. You must use the KT/12542 interface kit with the CDM-840's optional E1 Interface/RAN Optimization Hardware/FAST Feature upgrade.



CDM-840 Block Diagram – G.703 Unbalanced E1 Data Interface



KT/12542 G.703 75Ω Interface Cabling Kit (for G.703 Unbalanced E1 traffic)		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF, BNC 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-Way w/Bracket, 0.25-300 MHz, BNC 75Ω

Figure 5-26. CDM-840 Unbalanced G.703 E3/T375Ω Interface Kit – KT/12542

[illegible]

5.6 Cabling to the CDM-760 or CDM-750



1) For information on the CDM-760 or CDM-750's 1:1 auto-enable functionality, see:

- Chapter 4. MODEM and SWITCH CONFIGURATION
- CDM-760 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM760)
- CDM-750 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM750)

2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.6.1 CRS-170A → CDM-760/-750 Control and IF Interface Connections Using Cabling Kit KT-0000160



You must order terrestrial data interface components/kits separately. See Sect. 5.6.2 for CDM-760/-750 terrestrial data interface configuration and connection examples and details.

You must use the Comtech EF Data KT-0000160 1:1 Redundancy Control/IF Interface Cabling Kit (**Sect. 5.2.1**) for your control and L-Band Unit-to-Switch cabling connections. See **Sect. 5.6.1.1** for details about the CDM-760/-750 Modem-to-Switch Control Interface connection, and **Sect. 5.6.1.2** for details about the CDM-760/-750 Modem-to-Switch IF Interface connections.

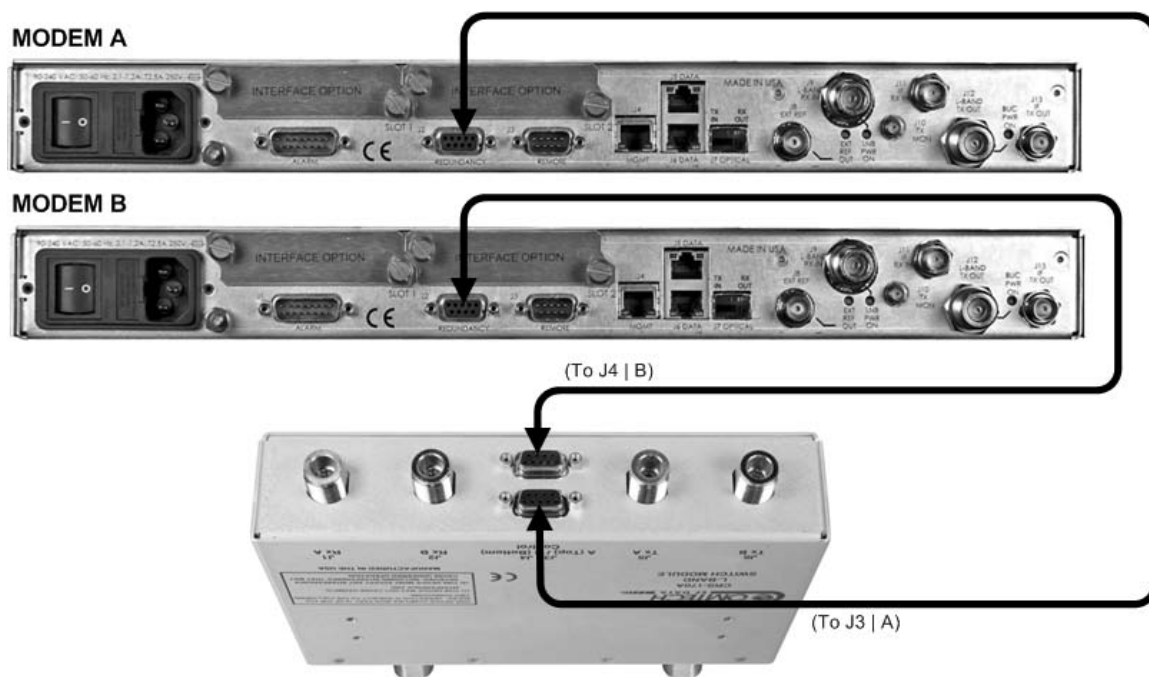


CAUTION – It is **ESSENTIAL** that you make the control and the IF Rx and Tx connections correctly.

5.6.1.1 Modem-to-Switch Control Interface Connection



- 1) Excluding the modems, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-27.
- 2) When you connect the Control Interface cables between the CRS-170A and the modems, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 5-27. CDM-760/-750 Modem-to-Switch Control Connections

5.6.1.2 Modem-to-Switch IF Interface Connection

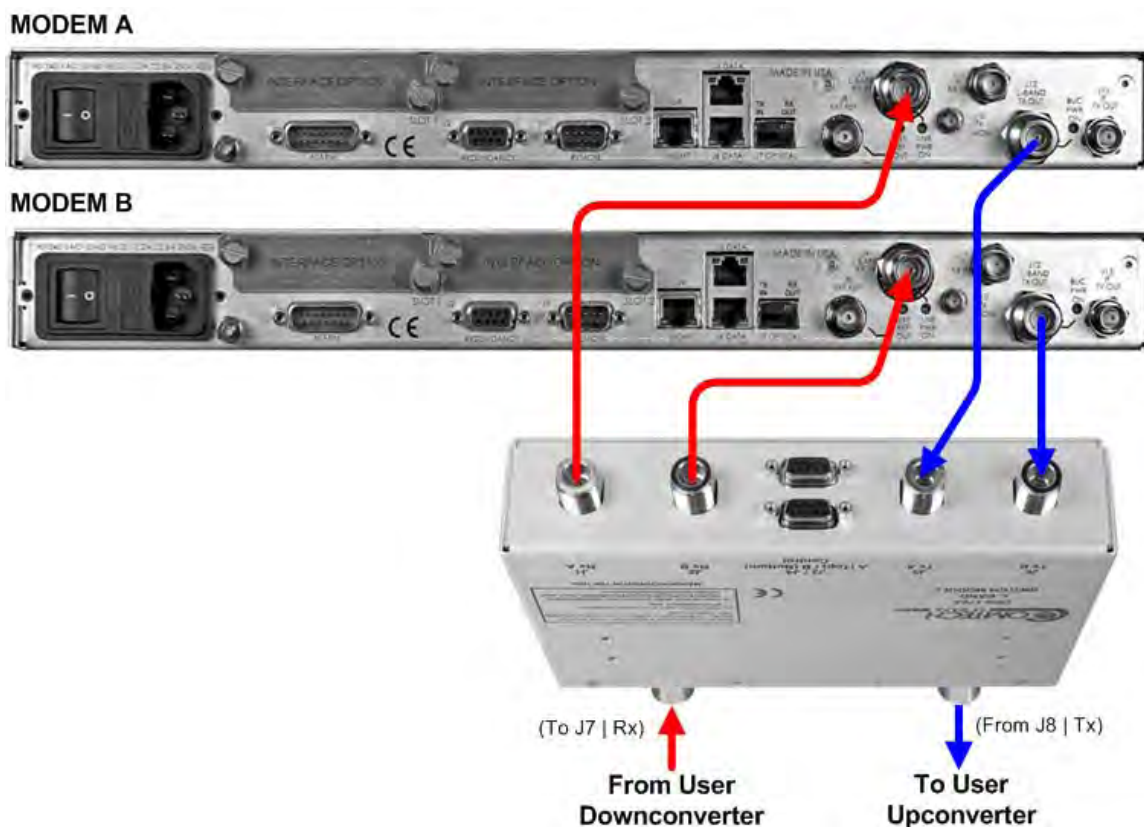


Excluding the modems, the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.1) provides all components shown in Figure 5-28.



EXAMPLE: The Tx IF from 'MODEM A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'MODEM B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

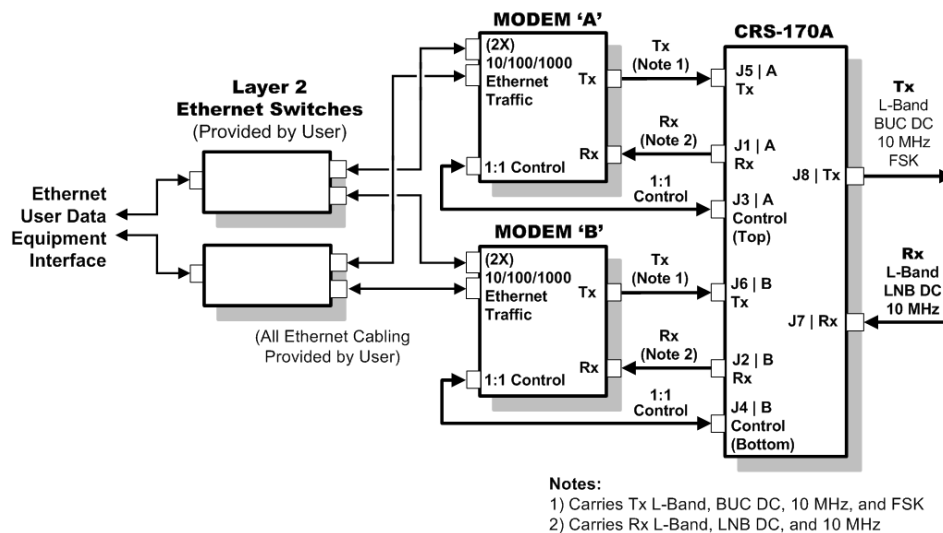
Figure 5-28. CDM-760/-750 Modem-to-Switch L-Band IF Connections

5.6.2 Modem-to-User Data Interface Connections and Examples

In addition to the control and IF Modem-to-Switch cabling shown previously, a number of data interface configuration kits are available for use with the CDM-760 and CDM-750 High-Speed Trunking Modems.

5.6.2.1 Gigabit Ethernet Data Interface Example

The CDM-760/-750 provides a 'J7 | OPTICAL' port and two Plug-In Interface Card (PIIC) slots for optional data traffic handling. Both modems otherwise feature two 10/100/1000 Gigabit Ethernet RJ-45 data interface ports by default. **Figure 5-29** shows a block diagram and cabling example for a CDM-760/-750 1:1 modem configuration using these RJ-45 ports (this example shows use of both ports). This configuration requires no cabling and component kit – you must use user-provided Ethernet cables and Layer 2 switches for direct connection to the modems.



CDM-760/-750 Block Diagram – Gigabit Ethernet 1:1 Operation

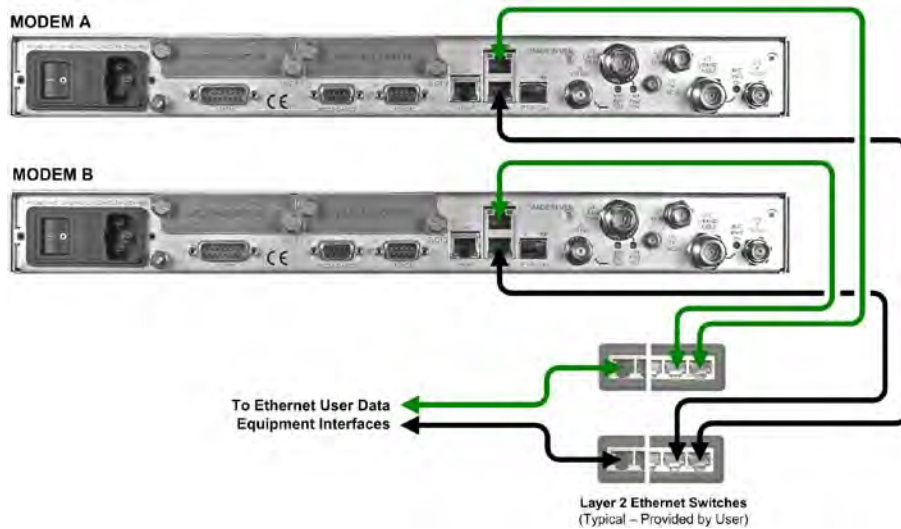


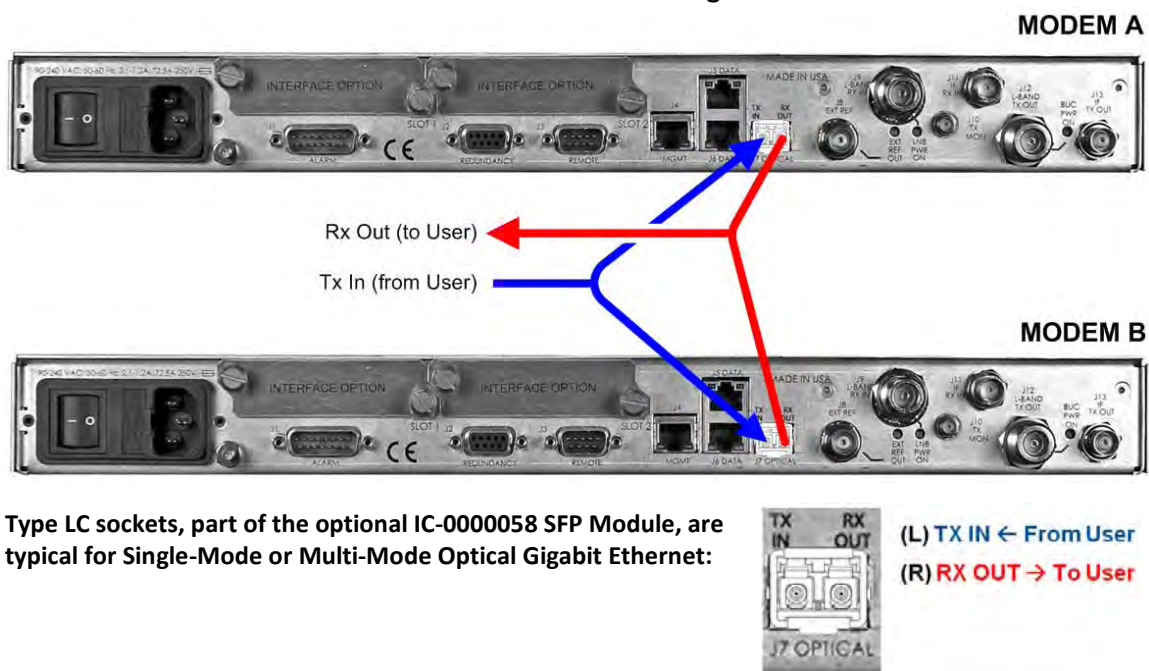
Figure 5-29. CDM-760/-750 RJ-45 Gigabit Ethernet 1:1 Example

5.6.2.2 Optical Gigabit Ethernet Interface Option Example

Figure 5-30 shows a CDM-760/-750 1:1 modem configuration that uses the FAST-activated 'J7 | OPTICAL' SFP port with the optional Optical Gigabit Ethernet Interface module (CEFD P/N IC-0000058).

You must use the cable assembly that is specific to *Single Mode* or *Multi Mode* operation:

- The CA-0000560 Optical Single-Mode Y-Cable set features **yellow** cables.
- The CA-0000559 Multi-Mode Y-Cable set features **orange** cables.



Type LC sockets, part of the optional IC-0000058 SFP Module, are typical for Single-Mode or Multi-Mode Optical Gigabit Ethernet:

CEFD Part No.	Qty	Description
CA-0000560	1	'Y' Cable Assy – RoHS-Compliant, Single-Mode Optical, LC Connectors

-OR-

CEFD Part No.	Qty	Description
CA-0000559	1	'Y' Cable Assy – RoHS-Compliant, Multi-Mode Optical, LC Connectors

Figure 5-30. CDM-760/-750 Optical Gigabit Ethernet 1:1 Example

5.6.2.3 Non-IP Data Interface Kit and Connection Examples

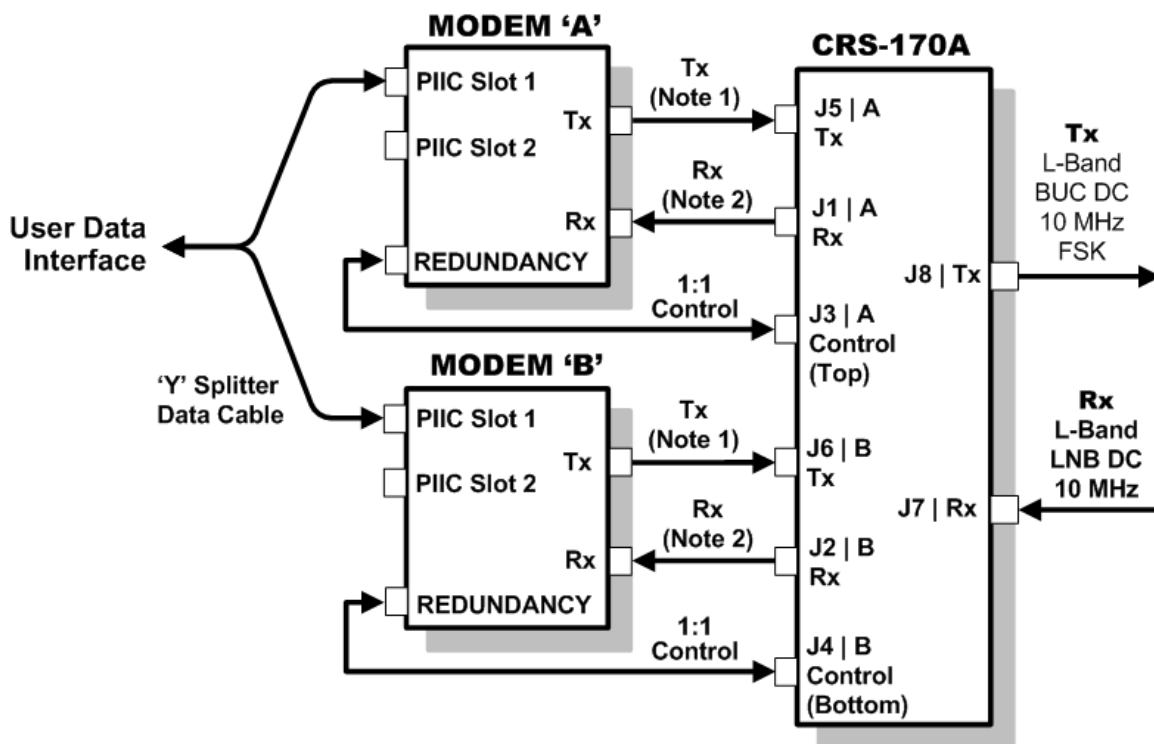


While different data interface cards may be installed into both PIIC (Plug-In Interface Card) slots, only one data interface type is operable at a given time. The data interface combinations allowable in the CDM-760/-750 chassis PIIC Slots 1 and 2 are as follows:

PIIC Slot 1	PIIC Slot 2
G.703 E3/T3	None
None	G.703 E3/T3

You will need separate cabling kits for each CDM-760/-750 non-IP data interface configuration. Each user data interface requires one interface kit per 1:1 modem pair. For example, **Figure 5-32** in **Sect. 5.6.2.3.1** identifies the interface kit and its quantities that you will use for the G.703 PIIC data interface.

Figure 5-31 shows the block diagram that is typical for the kits shown in this section. Note that this diagram does not apply to the default Gigabit Ethernet data interface configuration (**Figure 5-29**), which requires user-provided Ethernet cables and Layer 2 switches.

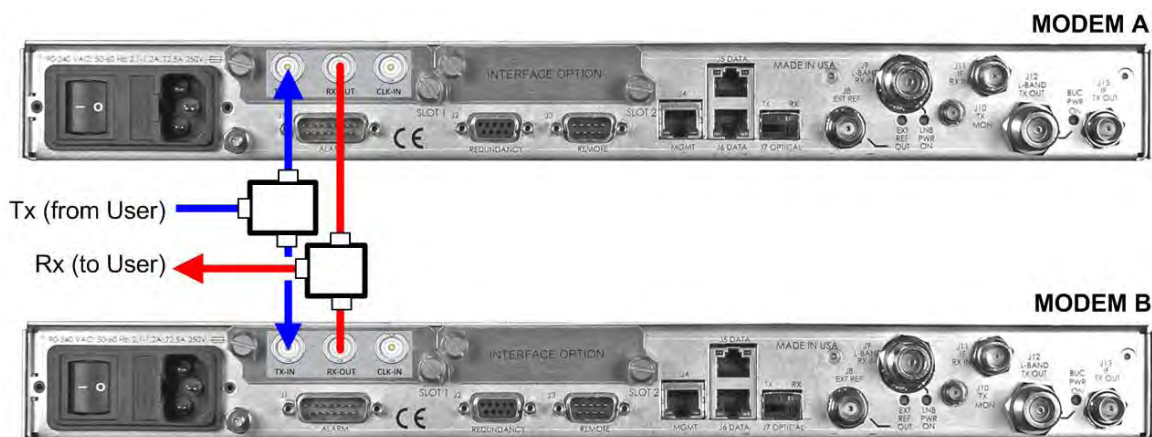


Notes:

- 1) Carries Tx L-Band, BUC DC, 10 MHz, and FSK
- 2) Carries Rx L-Band, LNB DC, and 10 MHz

Figure 5-31. CDM-760/-750 Block Diagram – User→Modem→Switch→Traffic

5.6.2.3.1 KT/12542 G.703 75Ω Data Interface Kit (for Single G.703 E3/T3 PIIC)



KT/12542 G.703 75Ω Interface Cabling Kit (for Single G.703 E3/T3 PIIC)		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF, BNC 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-Way w/Bracket, 0.25-300 MHz, BNC 75Ω

Figure 5-32. CDM-760/-750 G.703 E3/T3 PIIC Interface Kit KT/12542

[illegible]

5.7 Cabling to the CDM-570L or CDM-570AL



- 1) For information on the CDM-570L/AL's 1:1 auto-enable functionality, see:
 - Chapter 4. MODEM AND SWITCH CONFIGURATION
 - CDM-570A/CDM-570AL/CDMR-570AL Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM570A)
 - CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM)
- 2) For detailed information about the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.7.1 CRS-170A→CDM-570L/AL Interface Connections Using 1:1 Redundancy Kit KT/10860-1

You must use the items provided in the Comtech EF Data KT/10860-1 1:1 Redundancy Kit for all possible CDM-570L/AL data interface configurations:

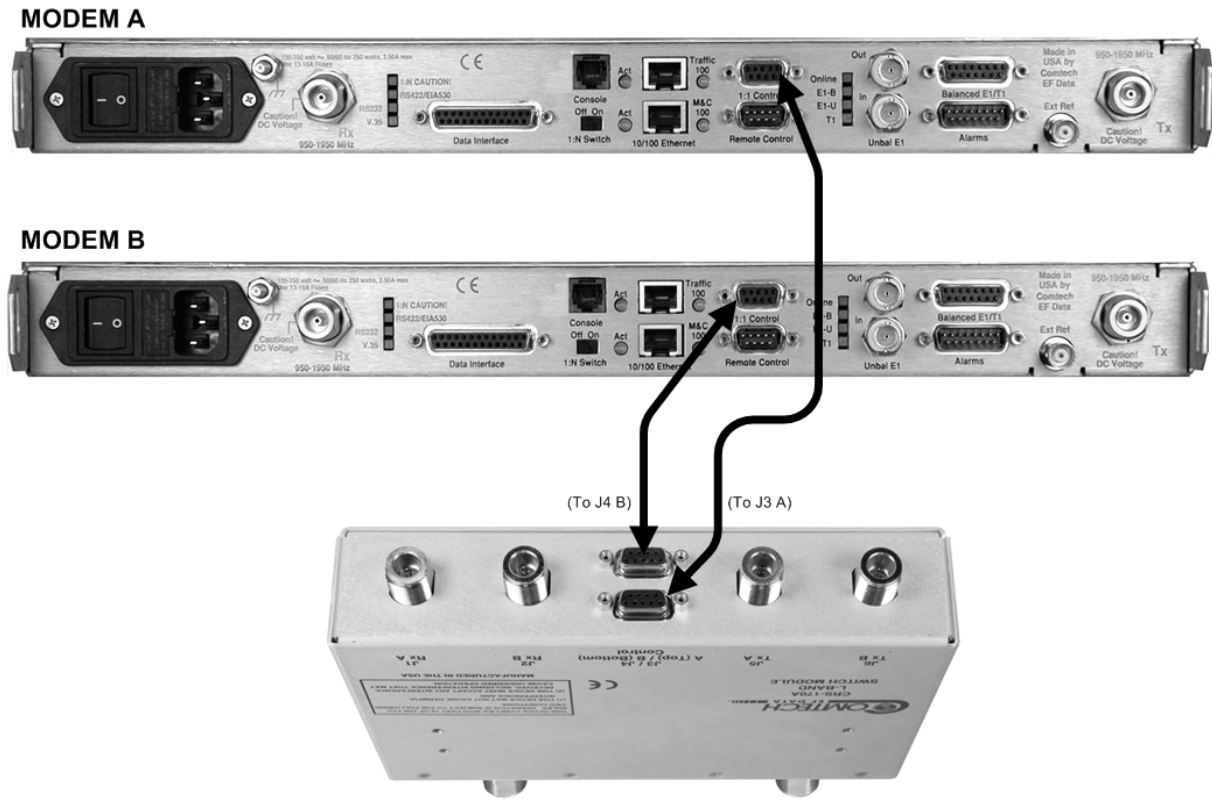
KT/10860-1 1:1 Redundancy Kit – Interface Cabling Reference (CRS-170A → CDM-570L/AL)				
CEFD Part No.	Qty/Kit (REF)	Description	Used For	Ch. 5 Fig
PL/10129-1	1	CRS-170A Switch – Top Assembly	1:1 Redundancy	5-32 5-33
CA/WR9378-4	2	Control Cable – Universal, DB-9M → DB-9M, 4'	Modem → Switch Control	5-32
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	Modem → Switch IF Interface	5-33
CA/RB10461-1	1	Cable – 1:1 Y-Splitter, (2X) DB-25M → DB-25F	EIA-422/232 Interface	5-35
CA/WR10522-1	1	Cable – 1:1 Y-Splitter, (2X) DB-15M → DB-15F	G.703 Balanced	5-36
KT/10553-1	1	G.703 Unbalanced Interface Kit containing: (Qty 4) CA/BNC75OHM Cable – IF BNC, 1' (Qty 2) CN/BNC-Tee-JPJ T-Adapter, 50Ω BNC	G.703 Unbalanced	5-37

Figure 5-33 and **Figure 5-34** show how to connect a pair of CDM-570L/AL modems together with the CRS-170A L-Band 1:1 Redundancy Switch module; the table that accompanies each figure lists all cables and components needed from the KT/10860-1 for this initial switch-to-modem setup.

5.7.1.1 Modem-to-Switch Control Interface Connection



- 1) Excluding the modems, the KT/10860-1 CRS-170A 1:1 Redundancy Kit (see Sect. 5.7.1) provides all components shown in Figure 5-33.
- 2) When you connect the Control Interface cables between the CRS-170A and the modems, make sure that you securely fasten the screw locks on the Type ‘D’ connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 5-33. CDM-570L/AL Modem-to-Switch Control Connections

5.7.1.2 Modem-to-Switch IF Interface Connection

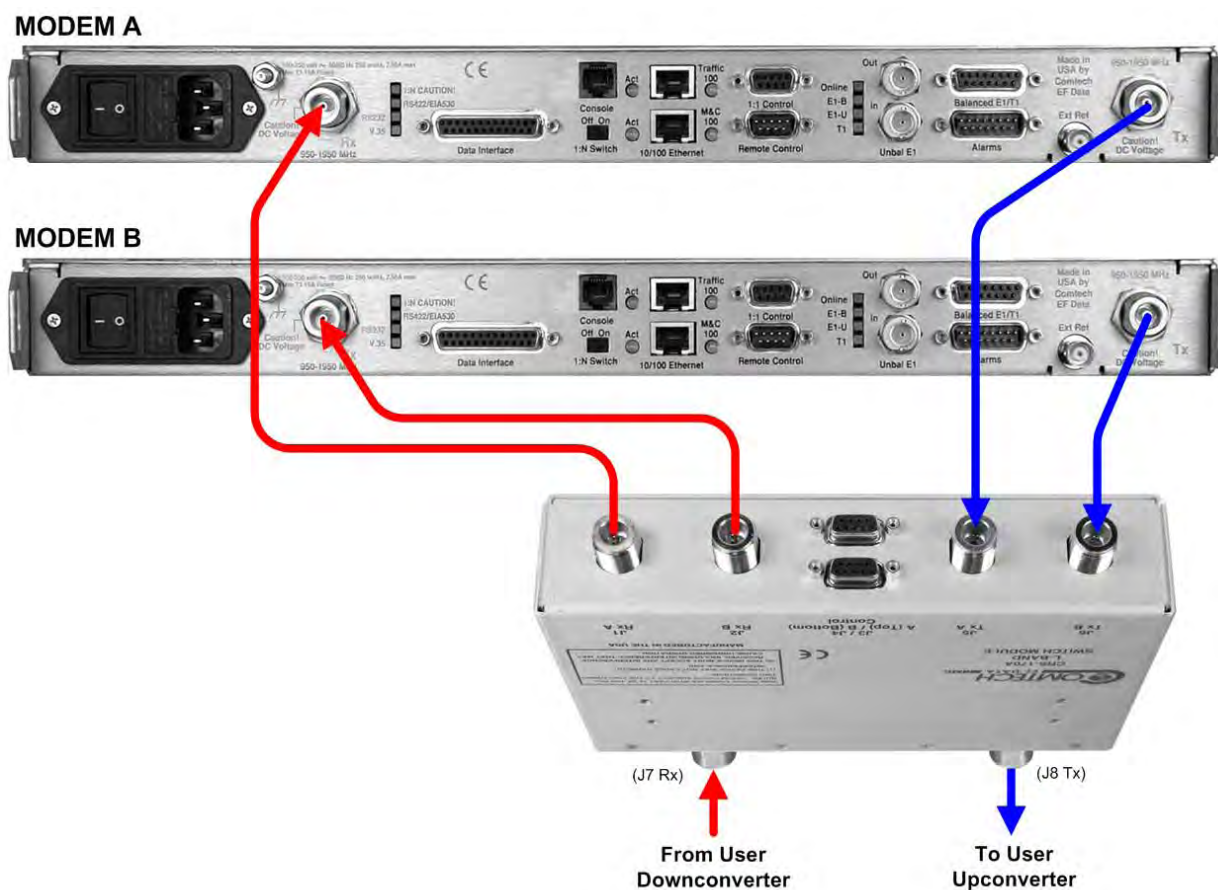


Excluding the modems, the KT/10860-1 CRS-170A 1:1 Redundancy Kit (see Sect. 5.7.1) provides all components shown in Figure 5-34.



EXAMPLE: The Tx IF from 'MODEM A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'MODEM B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-34. CDM-570L/AL Modem-to-Switch L-Band Connections

5.7.1.3 Modem-to-User Data Interface Connections and Examples

In addition to the control and IF Modem-to-Switch cabling shown previously, a number of data interface configurations are available for the CDM-570L/AL.

5.7.1.3.1 Modem-to-User Non-IP Data Interface Connections and Examples

The block diagram shown in **Figure 5-35** is typical for the examples shown in **Sects. 5.7.1.3.1.1** through **5.7.1.3.1.3**.

With the exception of the CDM-570L ONLY IP (10/100 Ethernet) Interface configuration shown in **Sect. 5.7.1.3.1.4**, where you must use user-provided Ethernet cables and hub, you will need one cable and component set per 1:1 modem pair for each user interface (see examples for specific quantities).

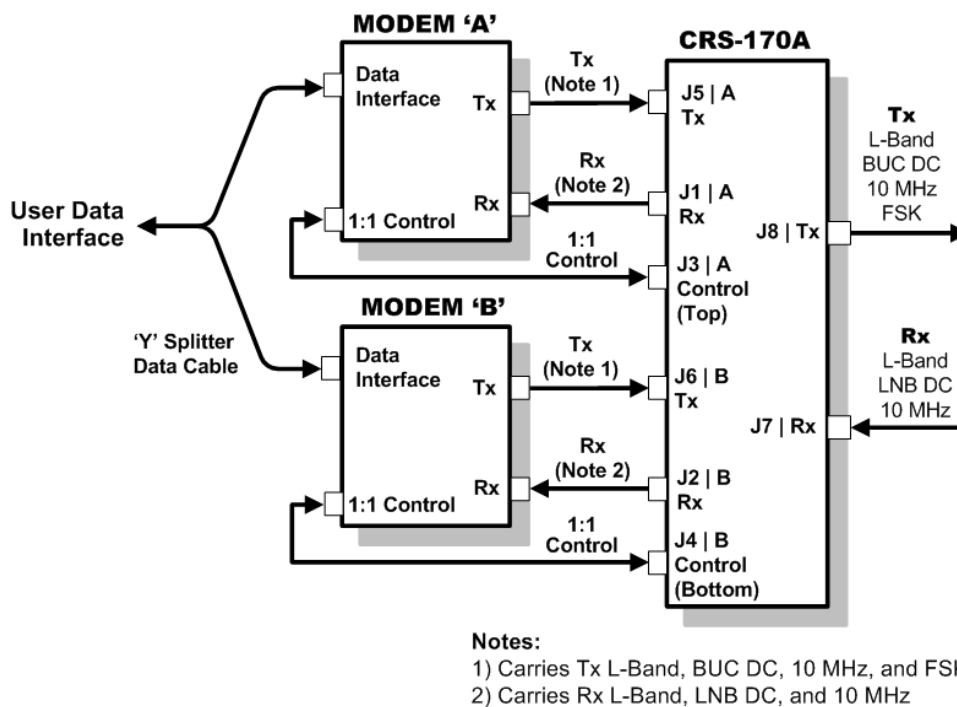


Figure 5-35. CDM-570L/AL Block Diagram – User→Modem→Switch→Traffic



Unless otherwise specified, the interface cables and components identified in each of the examples that follow are provided in the KT/10860-1 1:1 Redundancy Kit (see Sect. 5.7.1).

5.7.1.3.1.1 EIA-422/232 Interface Example

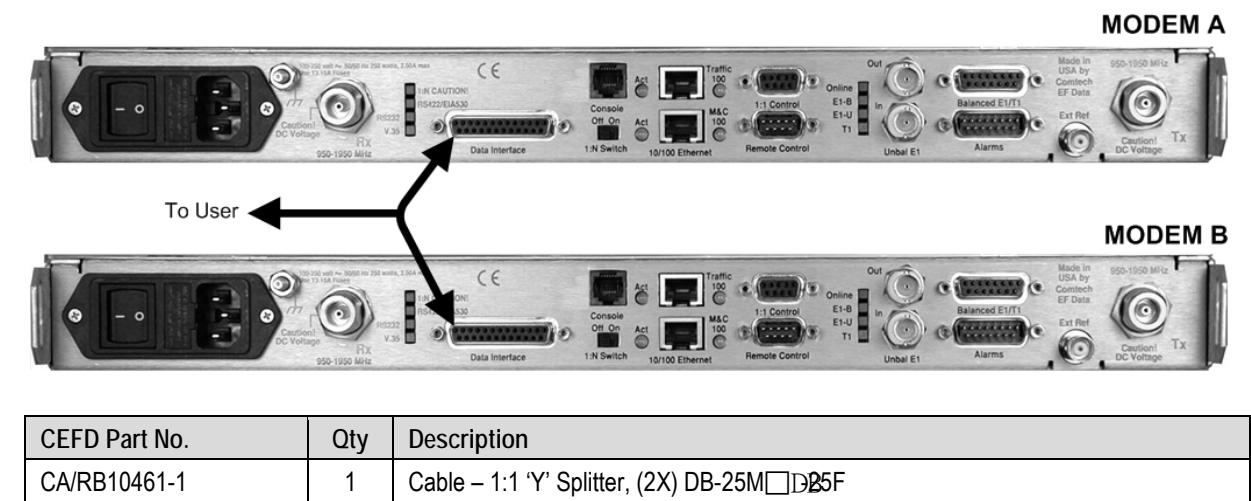


Figure 5-36. CDM-570L/AL EIA-422/232 1:1 Example

5.7.1.3.1.2 G.703 Balanced Interface Example

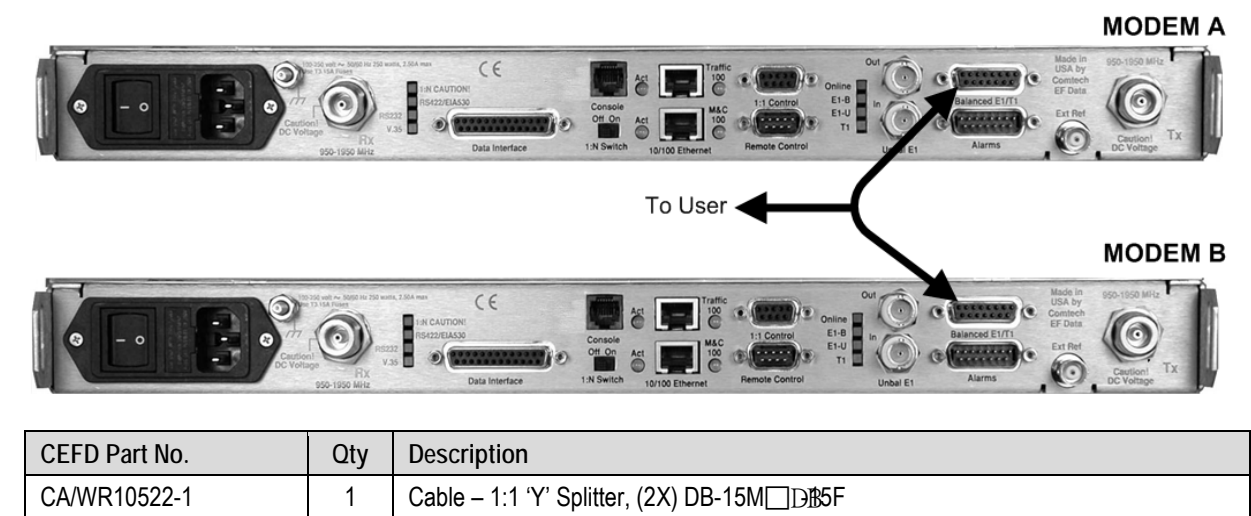


Figure 5-37. CDM-570L/AL G.703 Balanced 1:1 Example

5.7.1.3.1.3 G.703 Unbalanced Interface Example

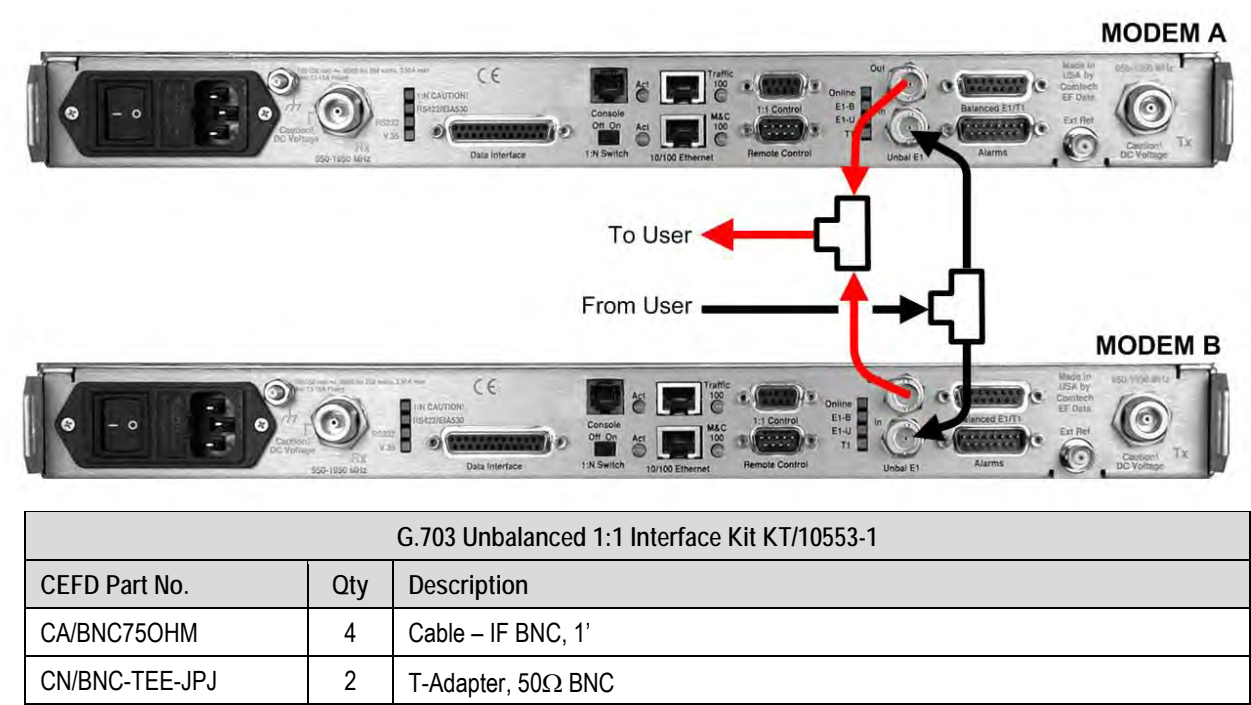


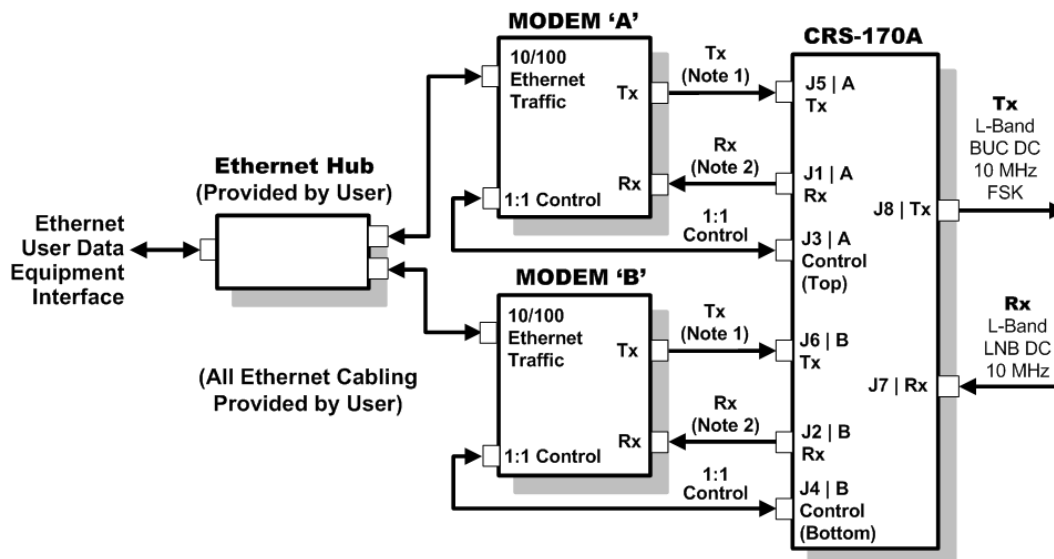
Figure 5-38. CDM-570L/AL G.703 Unbalanced 1:1 Example

5.7.1.3.1.4 Modem-to-User IP (10/100 Ethernet) Interface Example

Figure 5-39 shows the block diagram and cabling example for a CDM-570L/AL 1:1 modem configuration using the IP (10/100 Ethernet) Interface. This configuration requires no cabling kit – you must use user-provided Ethernet cables and hub for direct connection to the ports.



For the CDM-570L/AL in Managed Switch (Ethernet Bridge) Mode, you MUST use an external Ethernet hub to ensure that traffic will continue after a switchover. If an Ethernet switch is used, there could be a several minute outage while the Ethernet Switch “re-learns” the correct output Ethernet port. Using a “dumb” Ethernet hub allows LAN to WAN traffic to continue even after a switchover occurs since both modems will be receiving the LAN traffic.



Notes:

- 1) Carries Tx L-Band, BUC DC, 10 MHz, and FSK
- 2) Carries Rx L-Band, LNB DC, and 10 MHz

CDM-570L/AL Block Diagram – IP (10/100 Ethernet) Interface

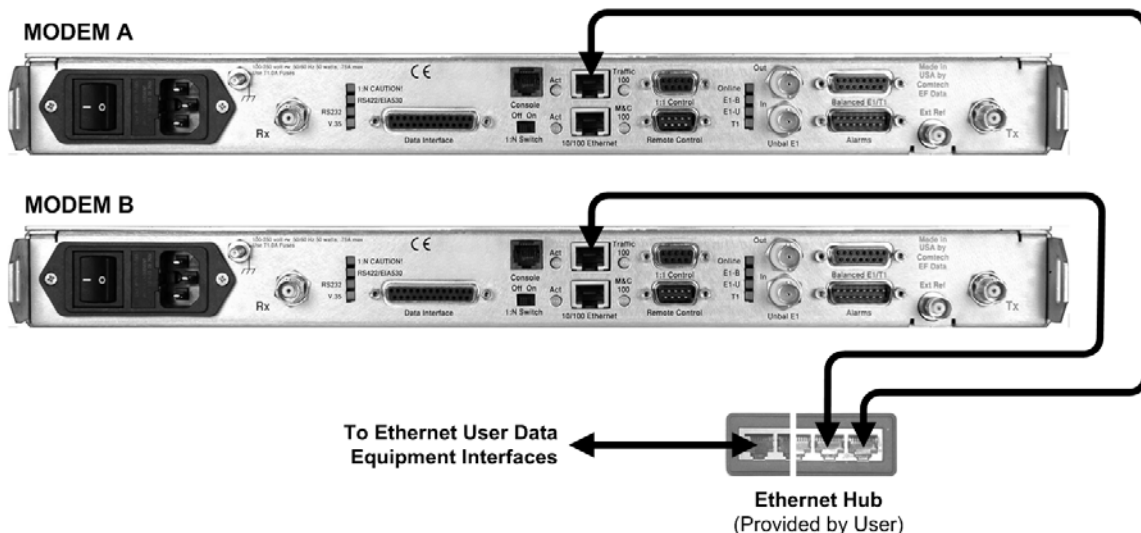


Figure 5-39. CDM-570L/AL IP (10/100 Ethernet) 1:1 Example

[illegible]

5.8 Cabling to the CDM-710GL



1) For information on configuring the CRS-170A L-Band 1:1 Redundancy Switch with the CDM-710GL High-Speed Satellite Modems for 1:1 operation, see:

- Chapter 4. MODEM AND SWITCH CONFIGURATION
- CDM-710G/710GL High-Speed Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM710G)

2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.8.1 CRS-170A → CDM-710GL Control and IF Interface Connections Using Cabling Kit KT/12551



You must order terrestrial data interface components/kits separately. See Sect. 5.8.2 for CDM-710GL terrestrial data interface configuration and connection examples and details.

You must use Comtech EF Data KT/12551 1:1 Redundancy Control/IF Interface Cabling Kit (Sect. 5.2.2) for your control and L-Band cabling connections. See Sect. 5.8.1.1 and Figure 5-40 for details about the CDM-710GL Modem-to-Switch Control Interface connections. See Sect. 5.8.1.2 and Figure 5-41 for details about the CDM-710GL Modem-to-Switch IF Interface connections. The table included with each figure lists the items you will need from the KT/12551 kit for your initial setup.

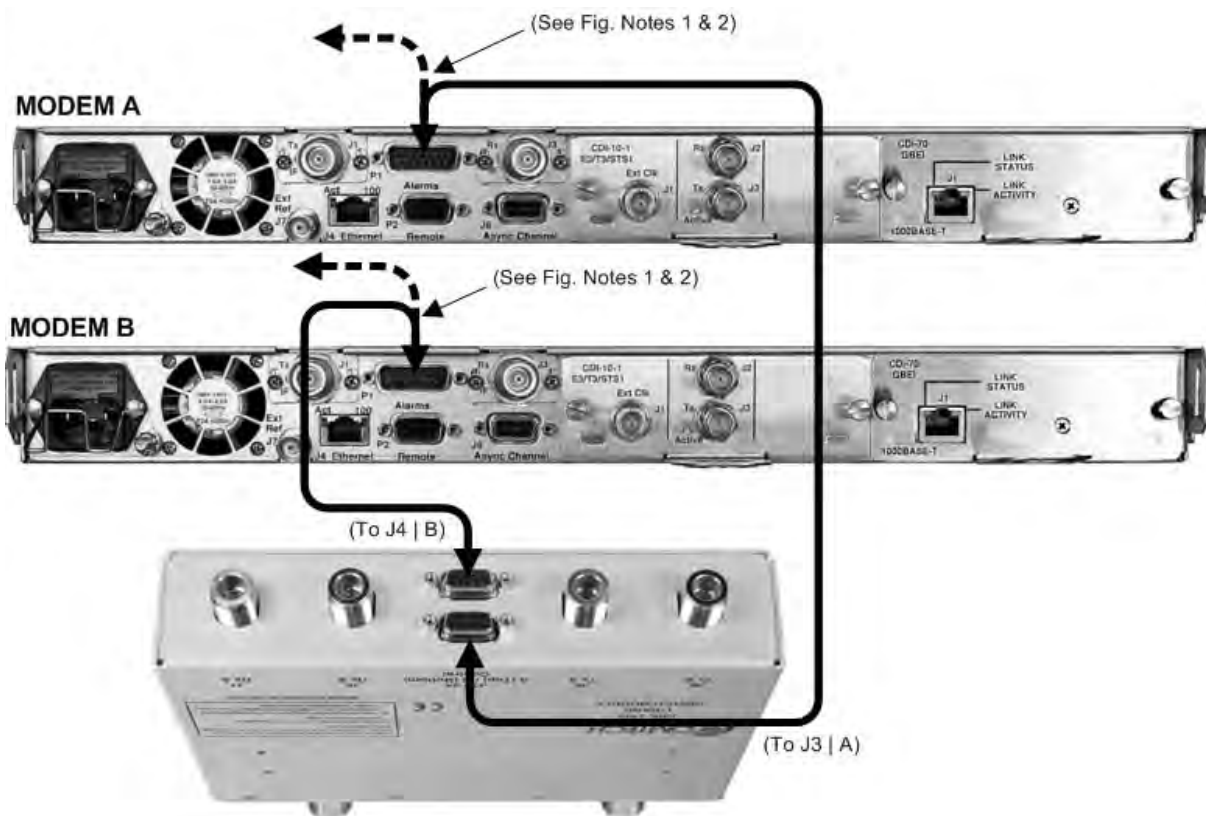


CAUTION – It is **ESSENTIAL** that you make the control and the IF Rx and Tx connections correctly.

5.8.1.1 Modem-to-Switch Control Interface Connection



- 1) Excluding the modems, the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.2) provides all components shown in Figure 5-40.
- 2) When you connect the Control Interface cables between the CRS-170A and the modems, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR12135-1 ^{See Notes}	2	Control Cable – Universal, DB-9M, 4'



FIGURE NOTES:

- 1) To provide user access to the modem “Fault Summary Relay,” Control ‘Y’ Cable (CEFD P/N CA/WR13011-4), sold separately, is available for use in place of the CA/WR12135-1 Control Cable.
- 2) The CA/WR12135-1 Control Cable will mute the Offline modem’s Tx IF. If this is not desired, then an alternate Control Cable (CEFD P/N CA-0000187), sold separately, is available for use instead.

Figure 5-40. CDM-710GL Modem-to-Switch Control Connections

5.8.1.2 Modem-to-Switch IF Interface Connection

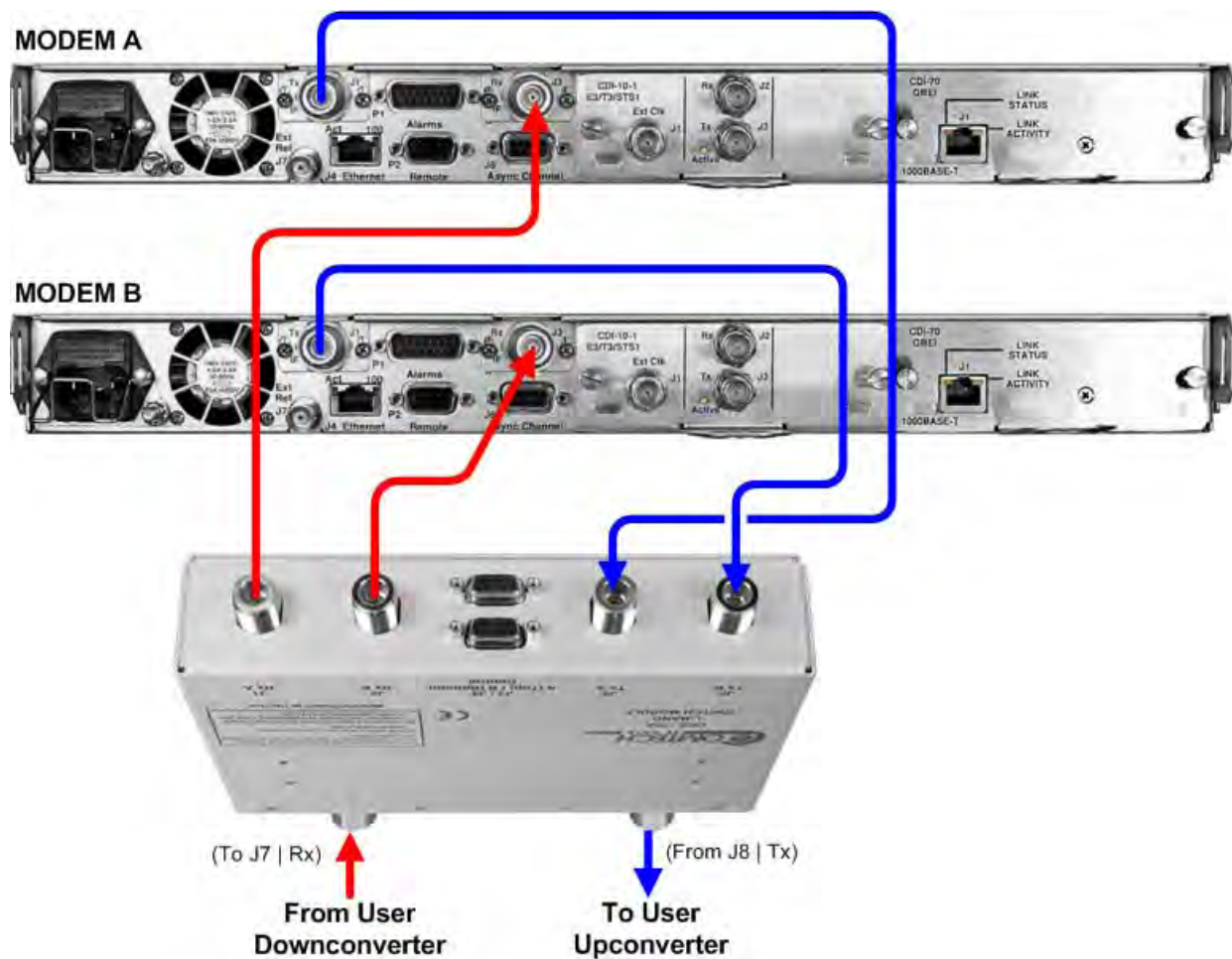


Excluding the modems, the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (see Sect. 5.8.1) provides all components shown in Figure 5-41.



EXAMPLE: The Tx IF from 'MODEM A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'MODEM B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-41. CDM-710GL Modem-to-Switch L-Band IF Connections

5.8.2 Modem-to-User Data Interface Kit and Connection Examples

In addition to the basic Modem-to-Switch cabling shown previously, a number of data interface configuration kits are available for use with the CDM-710GL High-Speed Satellite Modem.

Separate cabling kits are needed for these CDM-710GL data interfaces.



While different data interface cards may be installed into both Interface slots, only one data interface type is operable at a given time. The data interface combinations allowable in the CDM-710GL chassis Interface Slots 1 and 2 are as follows:

Interface Slot 1	Interface Slot 2
Single G.703 (CDI-10-1)	None
HSSI (CDI-60)	None
None	GigE (CDI-70)

5.8.2.1 Modem-to-User Non-IP Data Interface Kit and Connection Examples

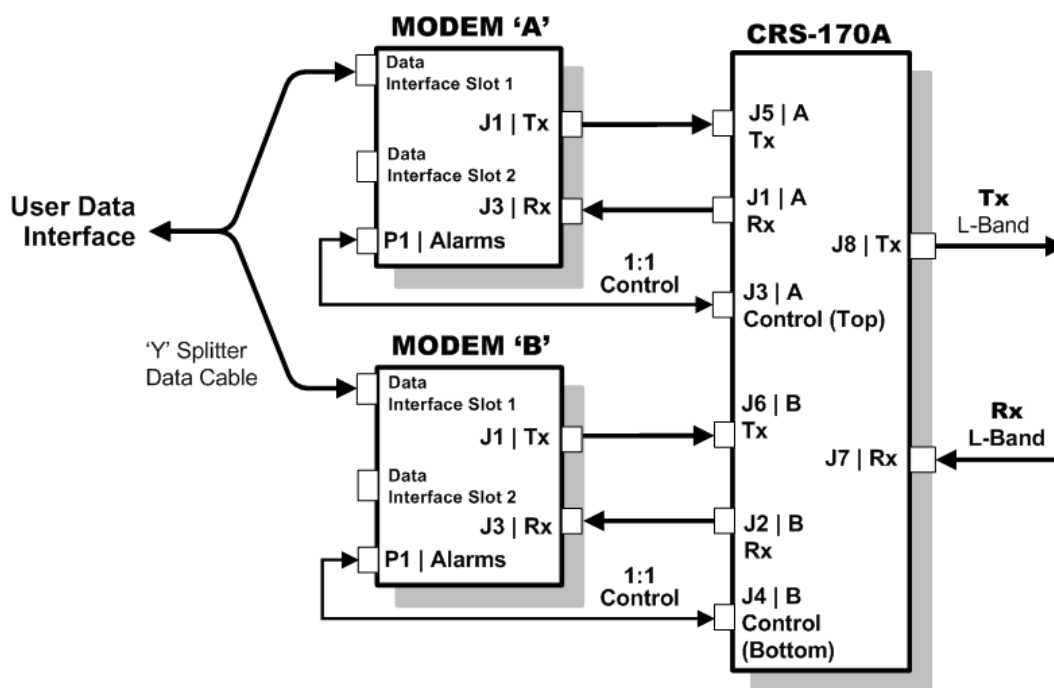


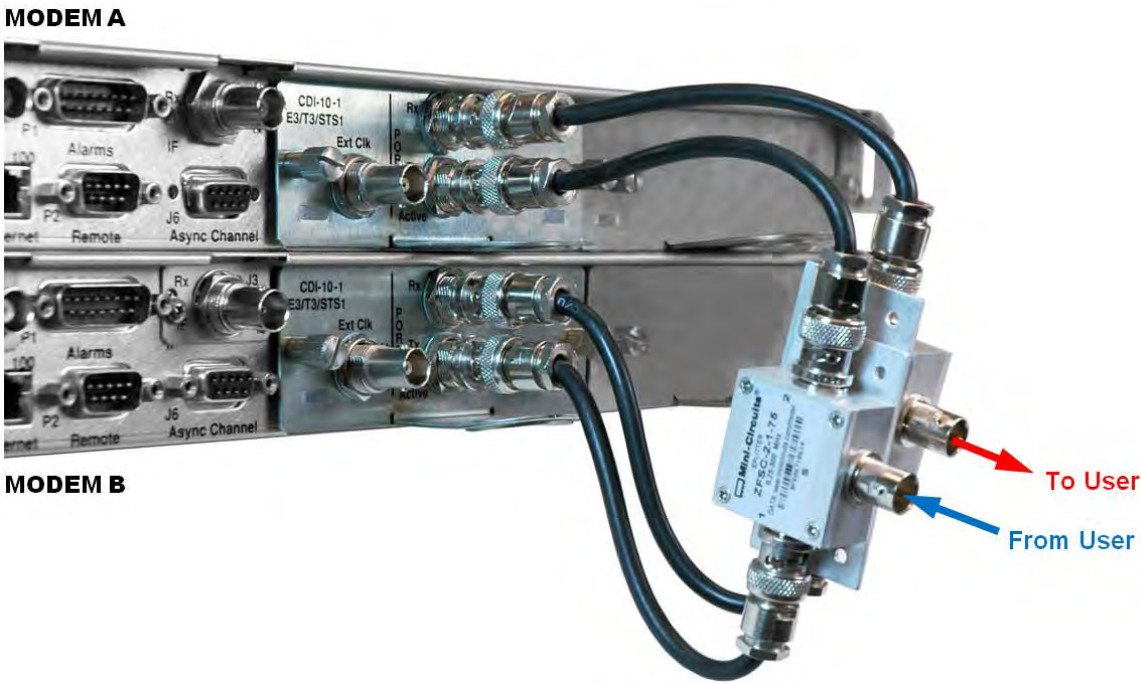
Figure 5-42. CDM-710GL Block Diagram – User→Modem→Switch→Traffic

Figure 5-42 shows the block diagram typical for the kits shown in Sects. 5.8.2.1.1 and Sect. 5.8.2.1.2. For example, Sect. 5.8.2.1.1 identifies the interface kit used with the CDI-10-1 Single G.703 data interface.

With the exception of the CDI-70 Gigabit Ethernet data interface configuration shown in Sect. 5.8.2.2, which uses user-provided Ethernet cables and Layer 2 Switch, you must use one interface kit per 1:1 modem pair for each interface (see examples for specific quantities).

5.8.2.1.1 **Single G.703 E3/T3/STS-1 75Ω Data Interface (CDI-10-1) Kit
KT/12583**

Figure 5-43 shows an example for a CDM-710GL 1:1 modem configuration with the CDI-10-1 Single G.703 data interface installed in Slot 1, and with Slot 2 empty. The figure shows installation of one KT/12583 Single G.703 Interface Kit.



KT/12583 Single G.703 (CDI-10-1) 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 5-43. CDM-710GL CDI-10-1 Single G.703 E3/T3/STS-1 1:1 Example

5.8.2.1.2 HSSI Data Interface (CDI-60) Kit KT/12586

Figure 5-44 shows an example for a CDM-710GL 1:1 modem configuration with the CDI-60 HSSI data interface installed in Slot 1, and with Slot 2 empty. The figure shows installation of one KT/12586 HSSI Interface Kit.

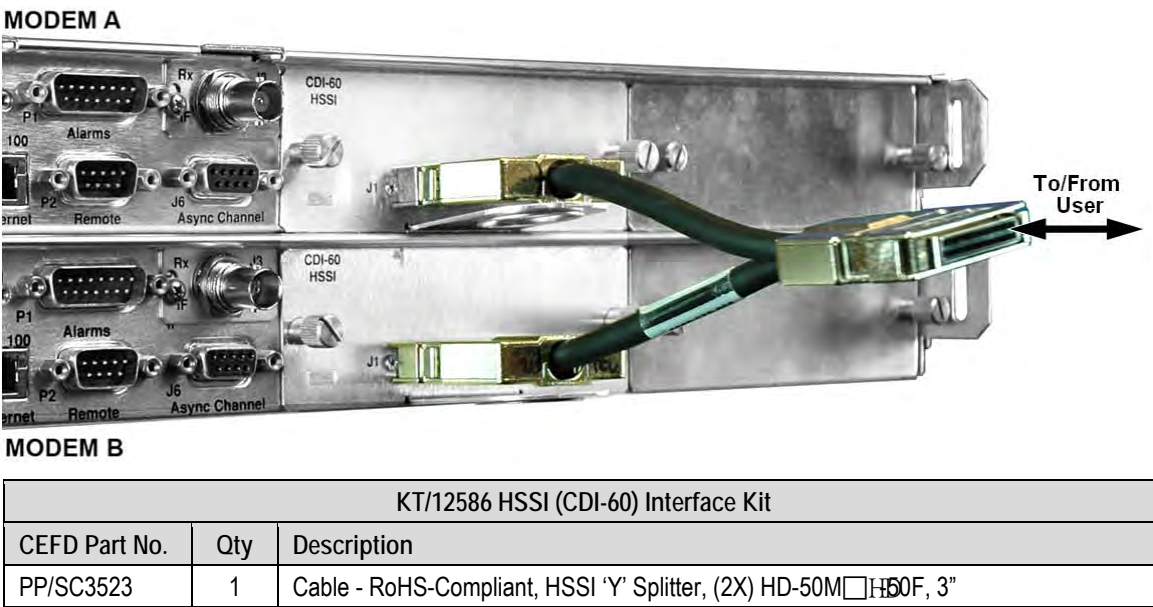


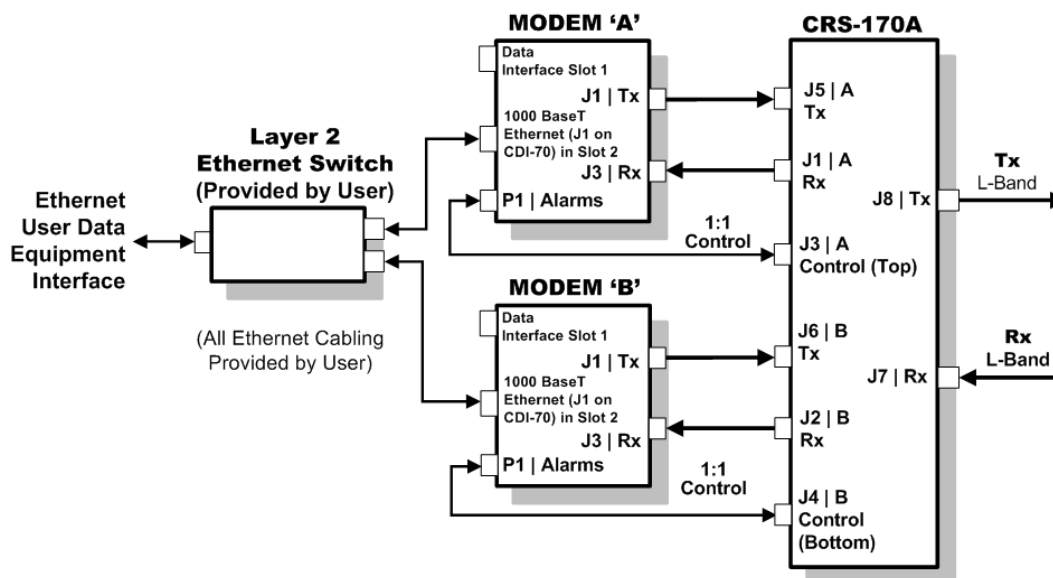
Figure 5-44. CDM-710GL CDI-60 HSSI 1:1 Example

5.8.2.2 Gigabit Ethernet Interface (CDI-70) Example



See CEFD White Paper “Bridged Ethernet Interface Redundancy” available for download from Comtech EF Data’s Web site (www.comtechefdata.com).

Figure 5-45 shows the block diagram and cabling example for a CDM-710GL 1:1 modem configuration with the CDI-70 Gigabit Ethernet data interface installed in Slot 2, with Slot 1 empty. This setup requires no cabling and component kit – you must use user-provided Ethernet cables and Layer 2 Switch for direct connection to the CDI-70.



CDM-710GL Block diagram – CDI-70 Gigabit Ethernet Interface

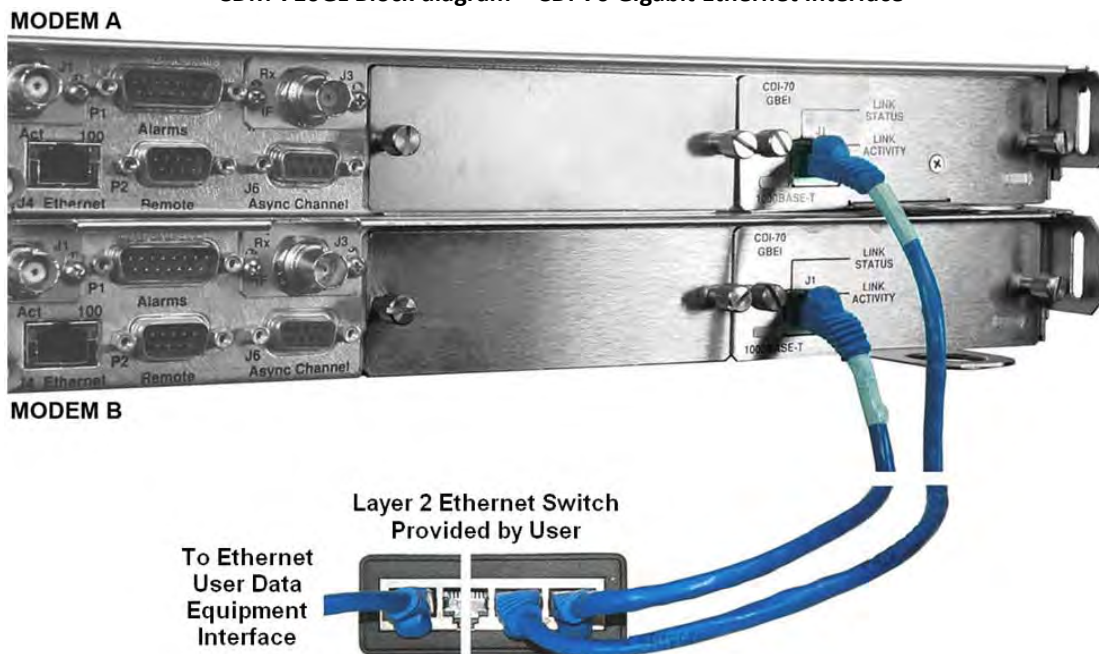


Figure 5-45. CDM-710GL CDI-70 Gigabit Ethernet 1:1 Example

[illegible]

5.9 Cabling to the CDM-710



1) For information on configuring the CRS-170A L-Band 1:1 Redundancy Switch with the CDM-710GL High-Speed Satellite Modems for 1:1 operation, see:

- Chapter 4. MODEM AND SWITCH CONFIGURATION
- CDM-710 Broadcast Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM710.IOM)

2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.9.1 CRS-170A → CDM-710 Control and IF Interface Connections Using Cabling Kit KT/12551



Terrestrial data interface components/kits must be ordered separately. See Sect. 5.9.2 for CDM-710 terrestrial data interface configuration and connection examples and details.

You must use Comtech EF Data's KT/12551 1:1 Redundancy Control/IF Interface Cabling Kit (Sect. 5.2.2) for your control and L-Band cabling connections. See Sect. 5.9.1.1 and Figure 5-46 for details about the CDM-710 Modem-to-Switch Control Interface connections. See Sect. 5.9.1.2 and Figure 5-47 for details about the CDM-710 Modem-to-Switch IF Interface connections. The table included with each figure lists the items you will need from the KT/12551 kit for your initial setup.

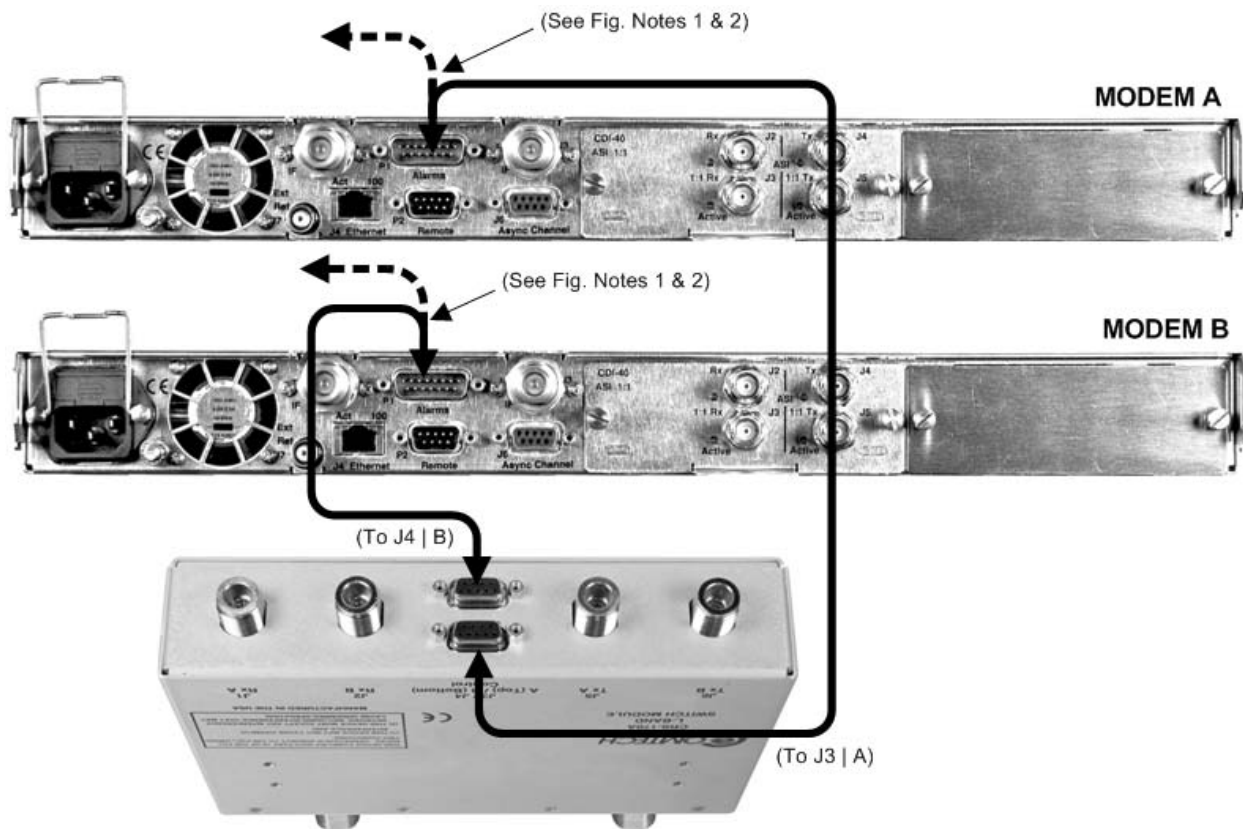


CAUTION – It is **ESSENTIAL** that you make the control and the IF Rx and Tx connections correctly.

5.9.1.1 Modem-to-Switch Control Interface Connection



- 1) Excluding the modems, the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.2) provides all components shown in Figure 5-46.
- 2) When you connect the Control Interface cables between the CRS-170A and the modems, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR12135-1 ^{See Notes}	2	Control Cable – Universal, DB-9M, 4'



FIGURE NOTES:

- 1) To provide user access to the modem “Fault Summary Relay,” Control ‘Y’ Cable (CEFD P/N CA/WR13011-4), sold separately, is available for use in place of the CA/WR12135-1 Control Cable.
- 2) The CA/WR12135-1 Control Cable will mute the Offline modem’s Tx IF. If this is not desired, then an alternate Control Cable (CEFD P/N CA-0000187), sold separately, is available for use instead.

Figure 5-46. CDM-710 Modem-to-Switch Control Connections

5.9.1.2 Modem-to-Switch IF Interface Connection

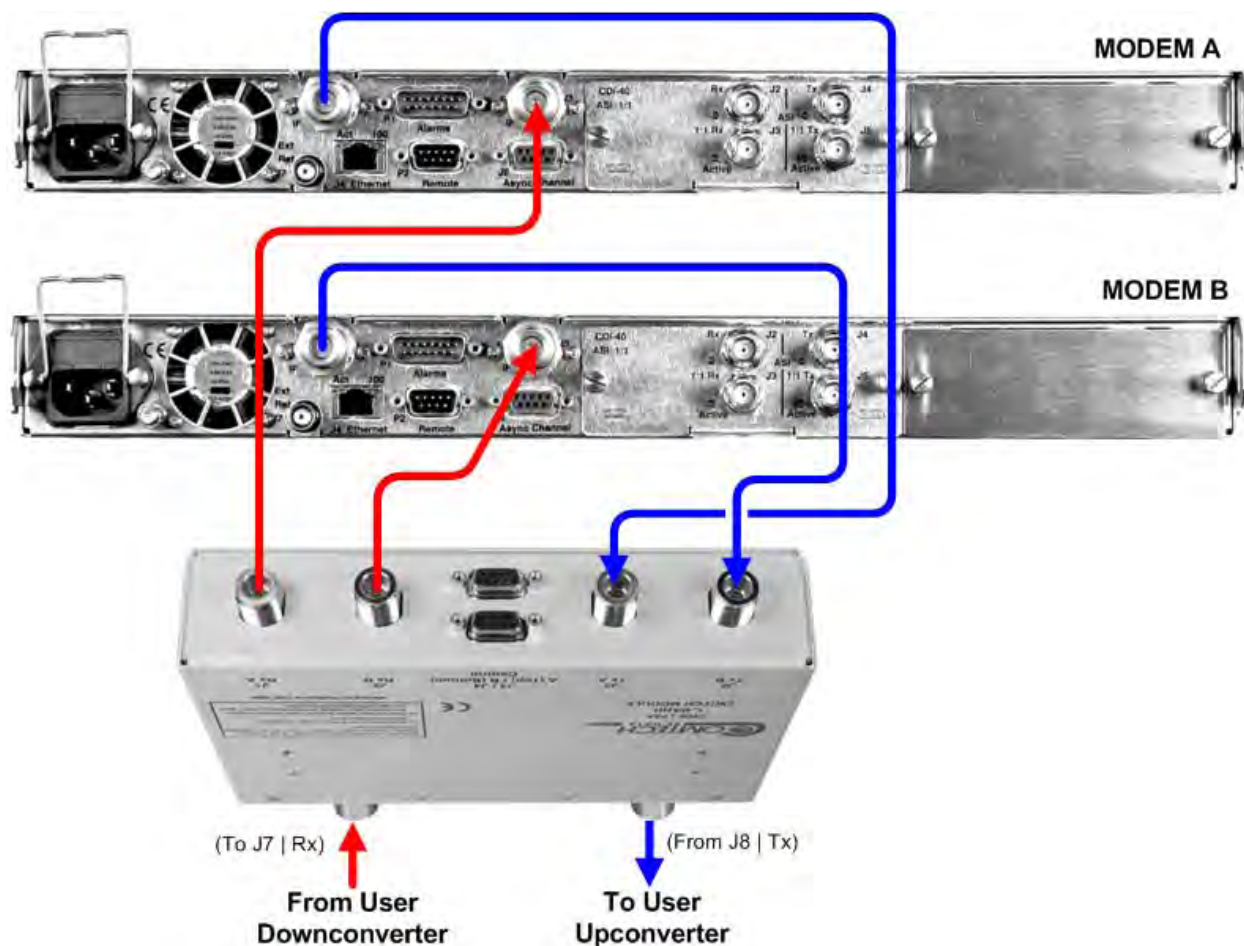


Excluding the modems, the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.2) provides all components shown in Figure 5-47.



EXAMPLE: The Tx IF from 'MODEM A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'MODEM B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-47. CDM-710 Modem-to-Switch L-Band IF Connections

5.9.2 Modem-to-User Data Interface Kit and Connection Examples

In addition to the basic Modem-to-Switch cabling shown previously, a number of data interface configuration kits are available for use with the CDM-710 Broadcast Satellite Modem. **Separate cabling kits are needed for these data interfaces.**



While different data interface cards may be installed into both Interface slots, only one data interface type is operable at a given time. The data interface combinations allowable in the CDM-710 chassis Interface Slots 1 and 2 are as follows:

Interface Slot 1	Interface Slot 2
ASI (CDI-40)	None
HSSI (CDI-60)	None
None	GigE (CDI-70)

5.9.2.1 Modem-to-User Non-IP Data Interface Kit and Connection Examples

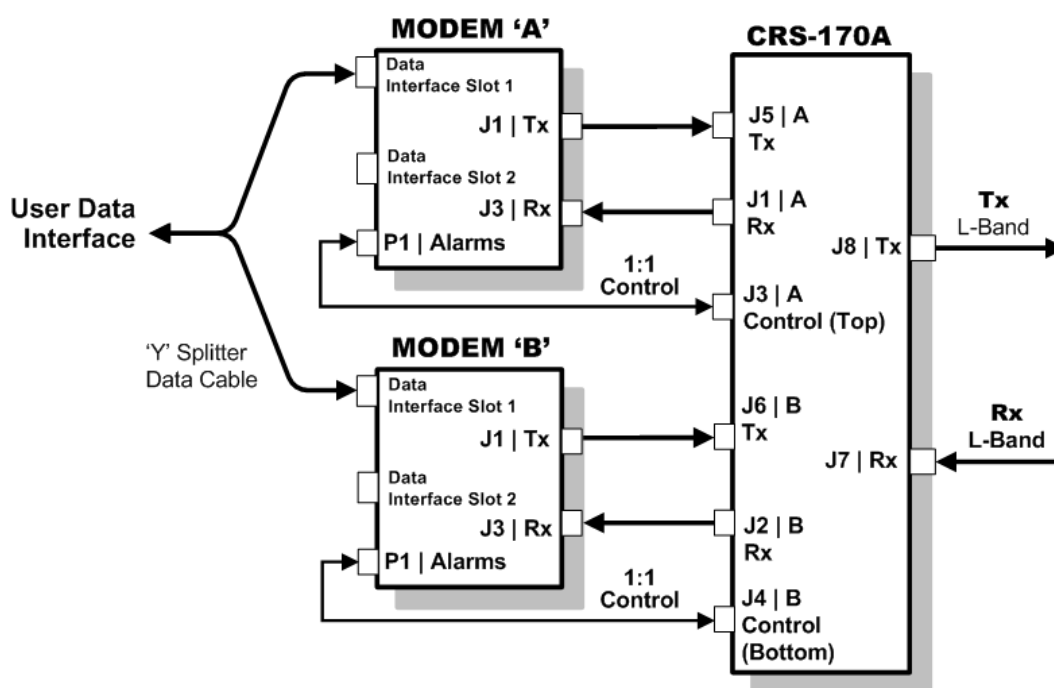


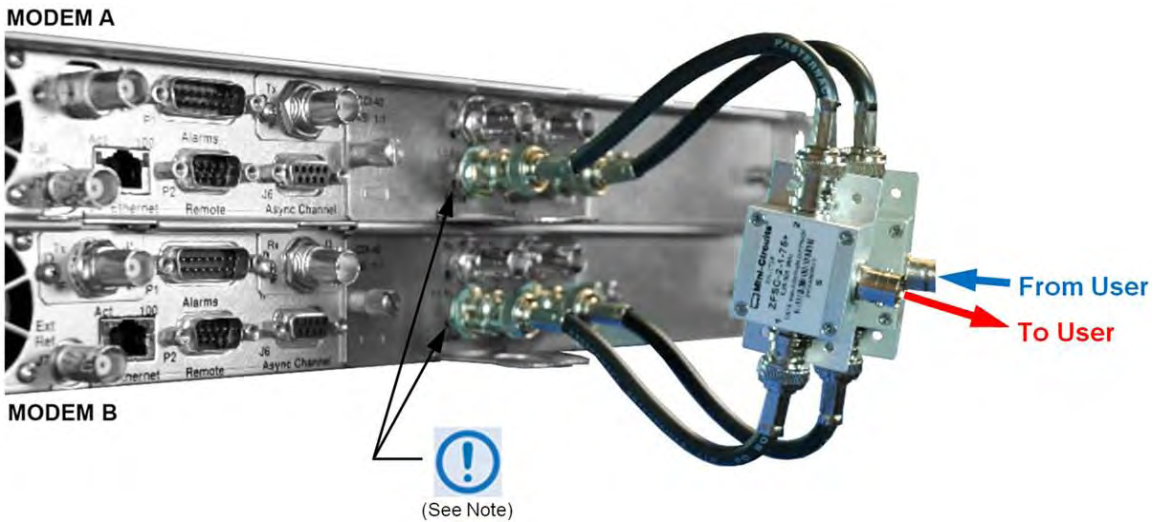
Figure 5-48. CDM-710 Block Diagram – User→Modem→Switch→Traffic


Figure 5-48 shows the block diagram typical for the kits shown in Sects. 5.9.2.1.1 and 5.9.2.1.2. For example, Sect. 5.9.2.1.1 identifies the interface kit used with the CDI-40 ASI 75Ω data interface.

With the exception of the CDI-70 Gigabit Ethernet data interface configuration shown in Sect. 5.9.2.2, which uses user-provided Ethernet cables and Layer 2 Switch, you must use one interface kit per 1:1 modem pair for each interface (see examples for specific quantities).

5.9.2.1.1 **ASI 75Ω Data Interface (CDI-40) Kit KT/12579**

Figure 5-49 shows an example for a CDM-710 1:1 modem configuration with the CDI-40 ASI data interface installed in Slot 1, with Slot 2 empty. The figure shows installation of one KT/12579 ASI Interface Kit.



 **Be sure to connect to the lower BNC connector pair labeled “1:1” on the CDI-40 ASI data interface. The Rx port on each interface has been tuned to be 3 dB higher amplitude to compensate for the presence of the RF/SA32KC-IN/OUT two-way combiner.**

KT/12579 ASI (CDI-40) 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 5-49. CDM-710 CDI-40 ASI 1:1 Example

5.9.2.1.2 HSSI Data Interface (CDI-60) Interface Kit KT/12578

Figure 5-50 shows an example for a CDM-710 1:1 modem configuration with the CDI-60 HSSI data interface installed in Slot 1, with Slot 2 empty. The figure shows installation of one KT/12578 HSSI Interface Kit.

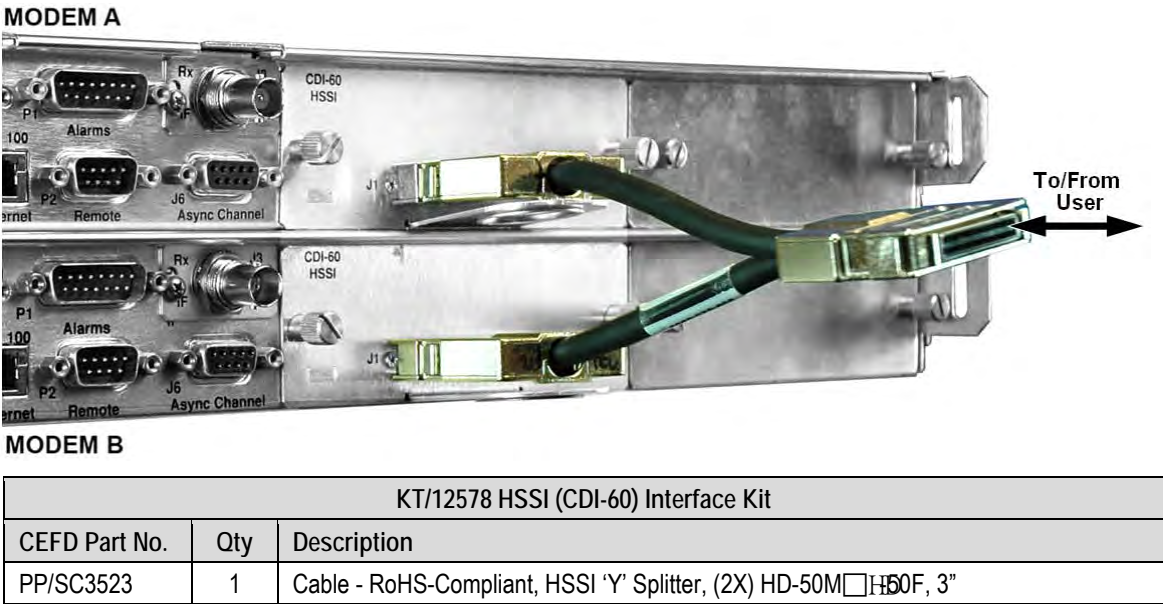


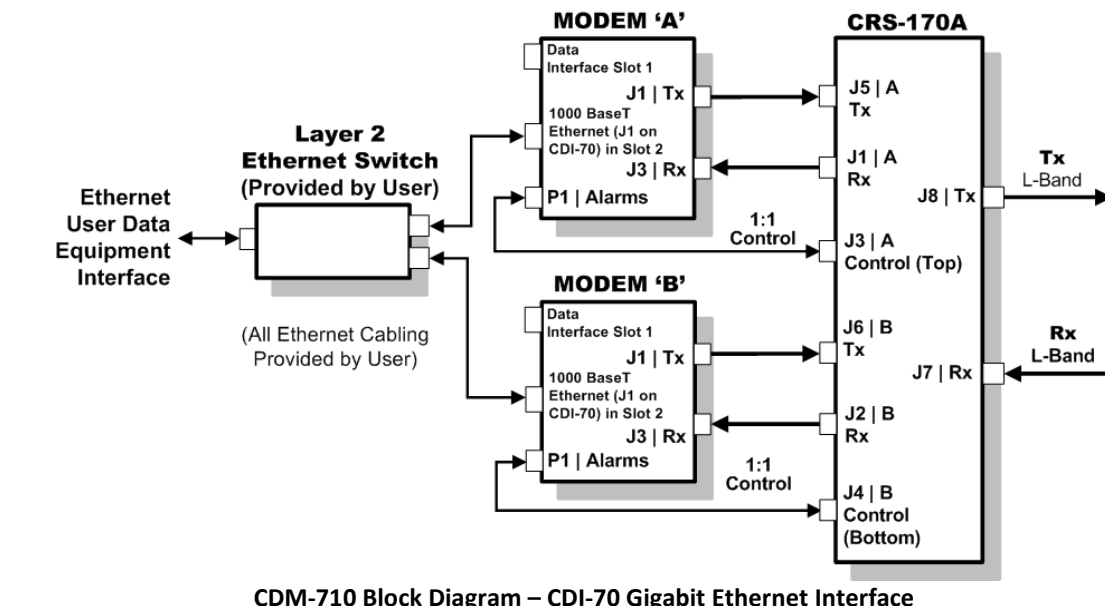
Figure 5-50. CDM-710 CDI-60 HSSI 1:1 Example

5.9.2.2 Gigabit Ethernet Data Interface (CDI-70) Example



See CEFD White Paper “Bridged Ethernet Interface Redundancy” available for download from Comtech EF Data’s Web site (www.comtechefdata.com).

Figure 5-45 shows the block diagram and cabling example for a CDM-710 1:1 modem configuration with the CDI-70 Gigabit Ethernet data interface installed in Slot 2, with Slot 1 empty. This setup requires no cabling and component kit – you must use user-provided Ethernet cables and Layer 2 Switch for direct connection to the CDI-70.



CDM-710 Block Diagram – CDI-70 Gigabit Ethernet Interface

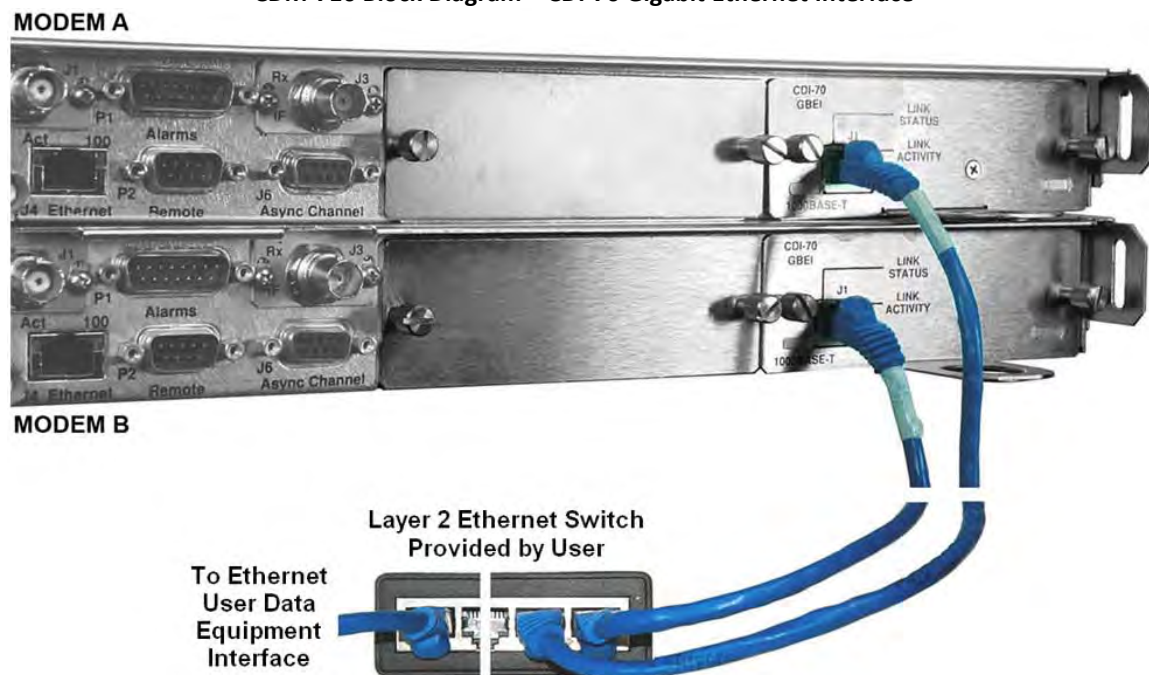


Figure 5-51. CDM-710 CDI-70 Gigabit Ethernet 1:1 Example

[illegible]

5.10 Cabling to the CDM-700



- 1) For information on configuring the CRS-170A L-Band 1:1 Redundancy Switch with the CDM-700 Satellite (L-Band) Modems for 1:1 operation, see:

- Chapter 4. MODEM AND SWITCH CONFIGURATION
- CDM-700 Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM700.IOM)

- 2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

5.10.1 CRS-170A → CDM-700 Connections Using Control and IF Interface Cabling Kit KT/12551



You must order terrestrial data interface components/kits separately. See Sect. 5.10.2 for CDM-700 terrestrial data interface configuration and connection examples and details.

You must use the Comtech EF Data KT/12551 1:1 Redundancy Control/IF Interface Cabling Kit (Sect. 5.2.2) for your control and L-Band Unit-to-Switch cabling connections. See Sect. 5.10.1.1 and Figure 5-52 for the CDM-700 Modem-to-Switch Control Interface connection details. See Sect. 5.10.1.2 for the CDM-700 Modem-to-Switch IF Interface connections details. The table included with each figure lists the items you will need from the KT/12551 kit for your initial setup.

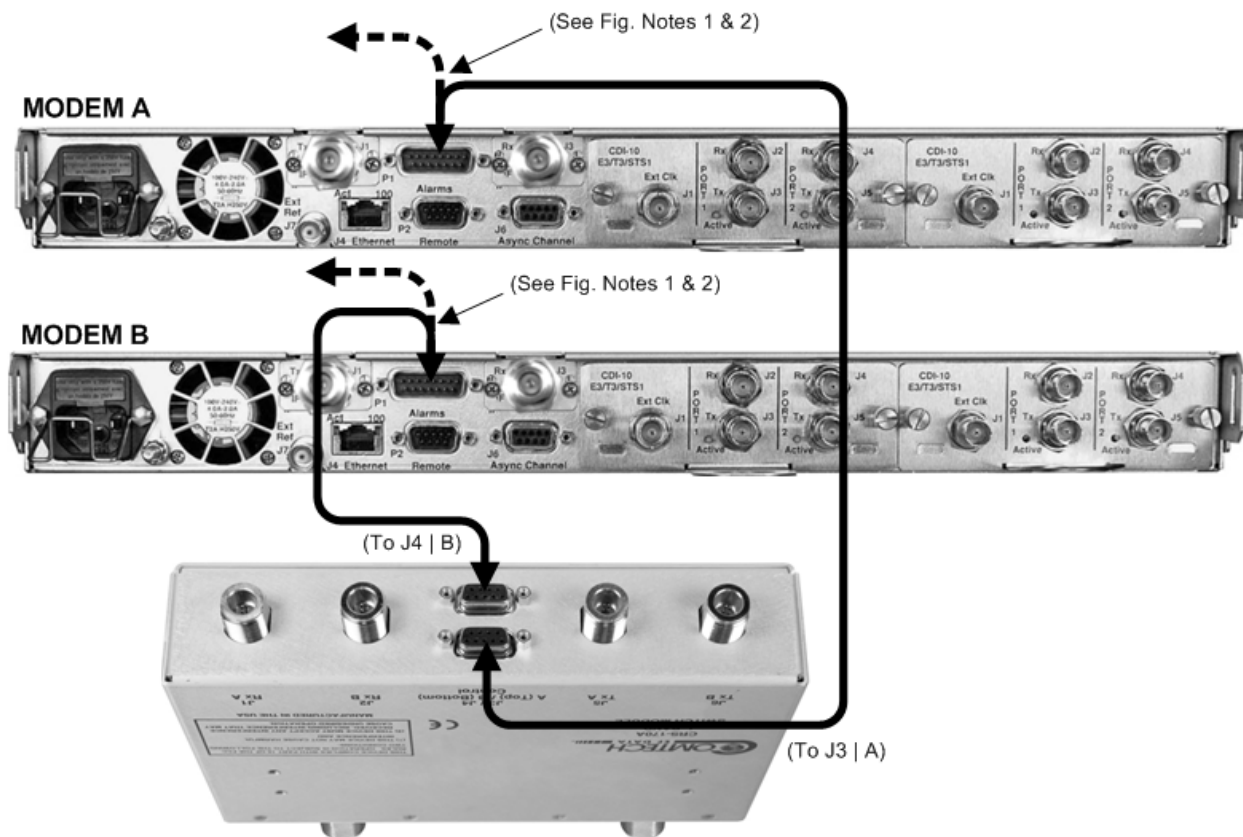


CAUTION – It is **ESSENTIAL** that you make the control and the IF Rx and Tx connections correctly.

5.10.1.1 Modem-to-Switch Control Interface Connection



- 1) Excluding the modems, the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.2) provides all components shown in Figure 5-52.
- 2) When you connect the Control Interface cables between the CRS-170A and the modems, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR12135-1 See Notes	2	Control Cable – Universal, DB-9M, 4'



FIGURE NOTES:

- 1) To provide user access to the modem “Fault Summary Relay,” Control ‘Y’ Cable (CEFD P/N CA/WR13011-4), sold separately, is available for use in place of the CA/WR12135-1 Control Cable.
- 2) The CA/WR12135-1 Control Cable will mute the Offline modem’s Tx IF. If this is not desired, then an alternate Control Cable (CEFD P/N CA-0000187), sold separately, is available for use instead.

Figure 5-52. CDM-700 Modem-to-Switch Control Connections

5.10.1.2 Modem-to-Switch IF Interface Connection

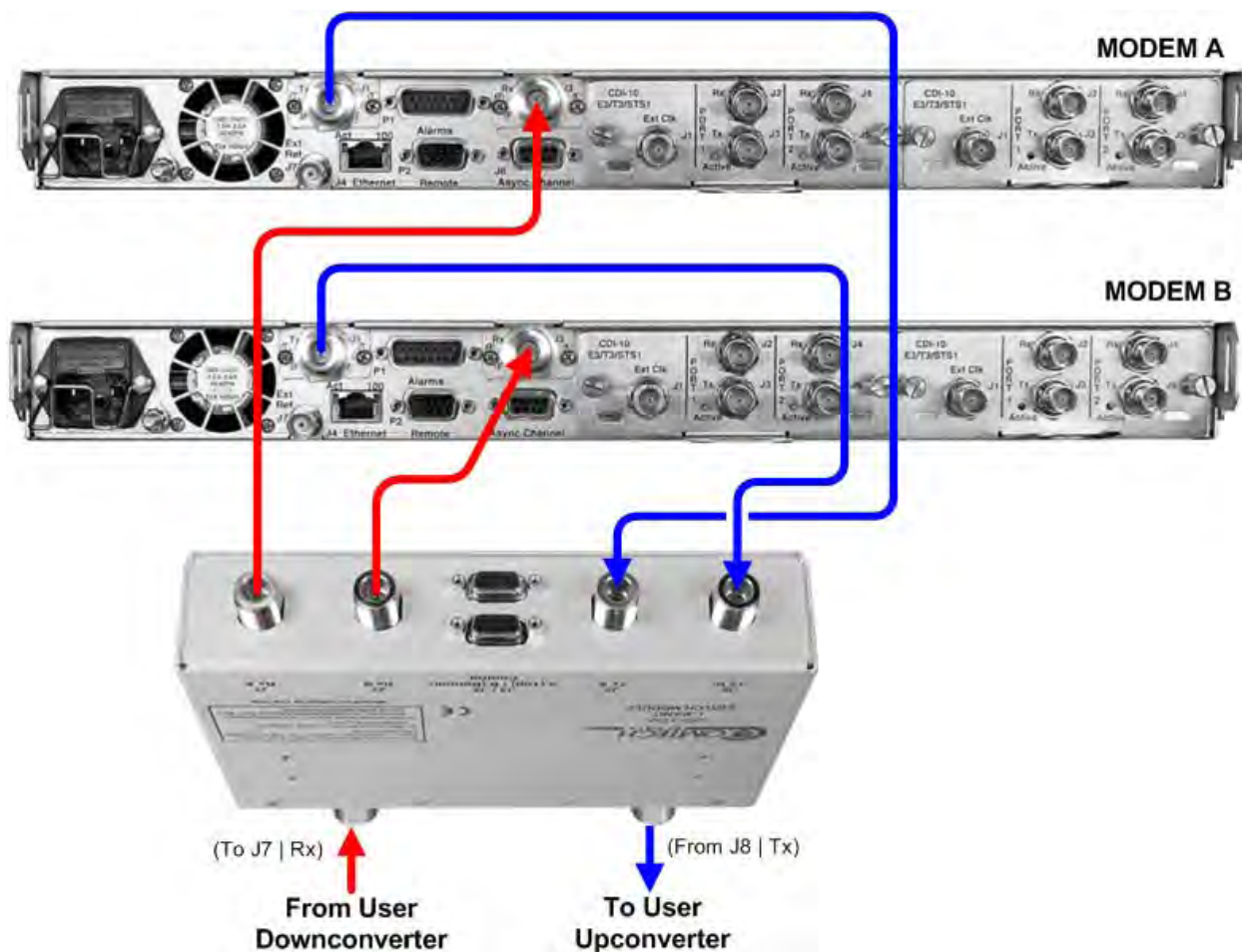


Excluding the modems, the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (Sect. 5.2.2) provides all components shown in Figure 5-53.



EXAMPLE: The Tx IF from 'MODEM A' connects to the Tx IF port 'J5 | Tx A' on the CRS-170A; similarly, the Tx IF from 'MODEM B' connects to the Tx IF port 'J6 | Tx B' on the CRS-170A.

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-53. CDM-700 Modem-to-Switch L-Band IF Connections

5.10.2 Modem-to-User Data Interface Kit and Connection Examples

In addition to the basic Modem-to-Switch cabling shown previously, a number of data interface configuration kits are available for use with the CDM-700 Satellite Modem. **Separate cabling kits are needed for these data interfaces.**



The data interface combinations allowable in the CDM-700 chassis Interface Slots 1 and 2 are as follows:

Interface Slot 1	Interface Slot 2
Dual G.703 (CDI-10)	None
	Dual G.703 (CDI-10)
	HSSI (CDI-60)
	GigE (CDI-70)
OC3 Optical (CDI-50-1) Single Mode 155MB Copper (CDI-50-1)	None
	None
HSSI (CDI-60)	HSSI (CDI-60)
	GigE (CDI-70)
	None
GigE (CDI-70)	GigE (CDI-70)
	Dual G.703 (CDI-10)
None	HSSI (CDI-60)
	GigE (CDI-70)
	None

5.10.2.1 Modem-to-User Non-IP Data Interface Kit and Connection Examples

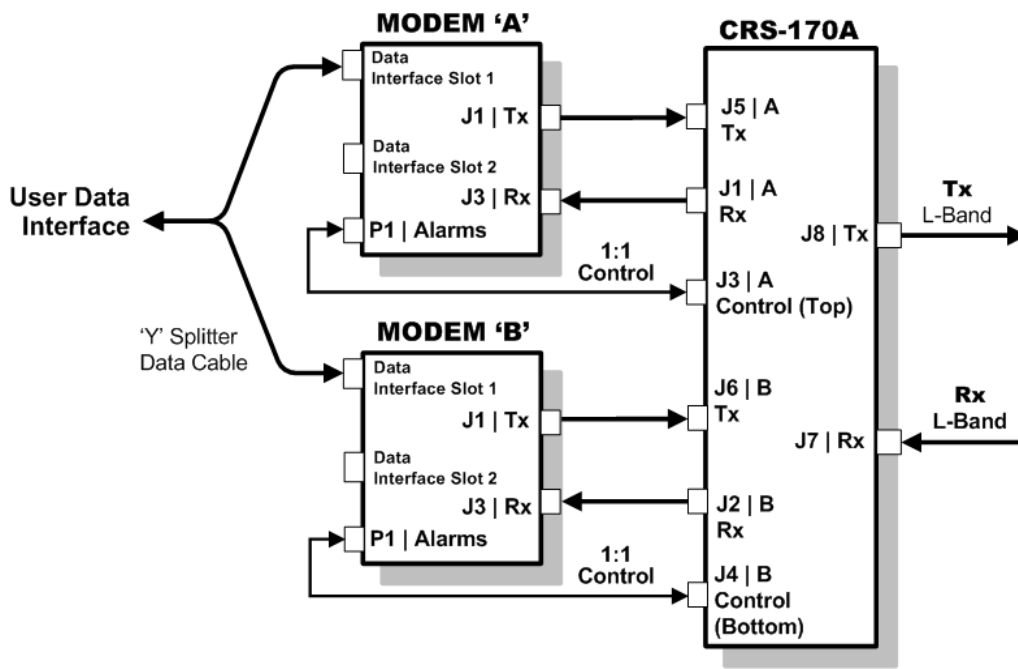


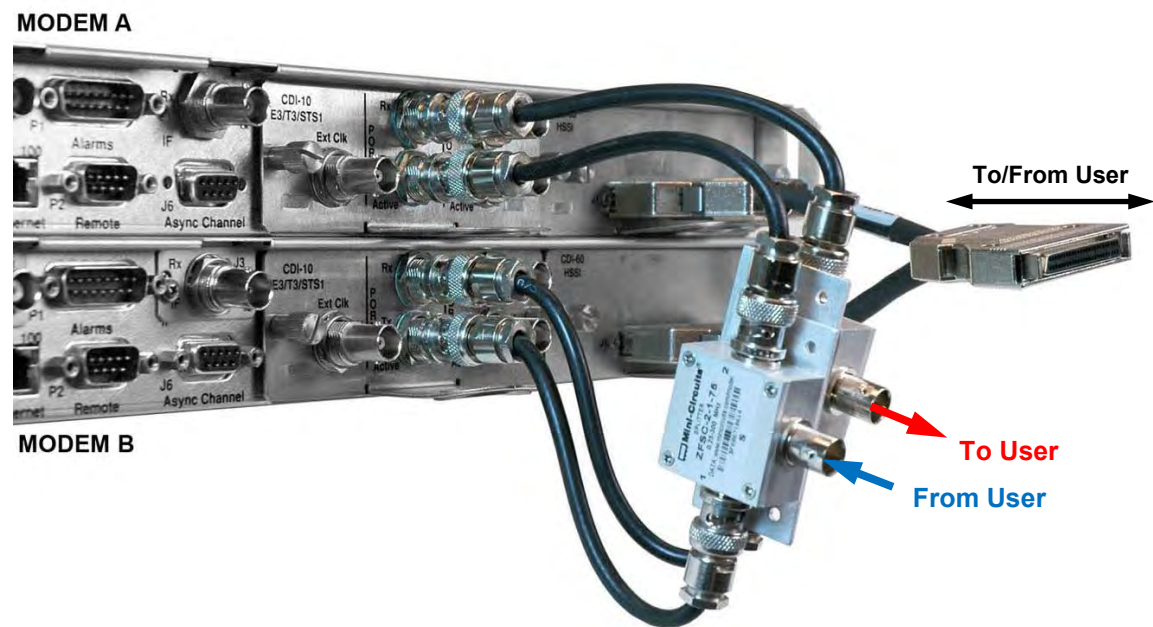
Figure 5-54. CDM-700 Block Diagram – User→Modem→Switch→Traffic

Figure 5-54 shows the block diagram typical for the kits shown in **Sects. 5.10.2.1.1** through **5.10.2.1.3**. For example, **Sect. 5.10.2.1.1** identifies the interface kit used with the CDI-10 Dual G.703 E3/T3/STS-1 and CDI-60 HSSI data interfaces.

With the exception of the CDI-70 Gigabit Ethernet data interface configuration shown in **Sect. 5.10.2.2**, which uses user-provided Ethernet cables and Layer 2 Switch, you must use one interface kit per 1:1 modem pair for each interface (see examples for specific quantities).

**5.10.2.1.1 Dual G.703 E3/T3/STS-1 75Ω Data Interface (CDI-10) Kit
KT/12582 and HSSI Data Interface (CDI-60) Kit KT/12586**

Figure 5-55 shows an example of a CDM-700 1:1 modem configuration with the CDI-10 Dual G.703 Data Interface installed in Slot 1, and the CDI-60 HSSI Data Interface installed in Slot 2. The figure depicts installation of one KT/12582 Dual G.703 Interface Kit (each kit can supply one or two CDI-10 interfaces), and one KT/12586 HSSI Interface Kit.



KT/12582 G.703 (CDI-10) 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	8	Cable – IF BNC, 75Ω, 1'
RF/SA32KC-IN/OUT	4	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

KT/12586 HSSI (CDI-60) Interface Kit		
CEFD Part No.	Qty	Description
PP/SC3523	1	Cable - RoHS-Compliant, HSSI 'Y' Splitter, (2X) HD-50M → HD-50F, 3"

Figure 5-55. CDM-700 CDI-10 G.703 E3/T3/STS-1, CDI-60 HSSI 1:1 Example

5.10.2.1.2 155MB Copper Data Interface (CDI-50) Kit KT/12583

Figure 5-56 shows an example for a CDM-700 1:1 modem configuration with a CDI-50 data interface installed in Slot 1 for use with 155MB Copper data, with Slot 2 empty. This figure shows installation of one KT/12583 155MB Copper Interface Kit – each kit can supply one or two CDI-50 interfaces.



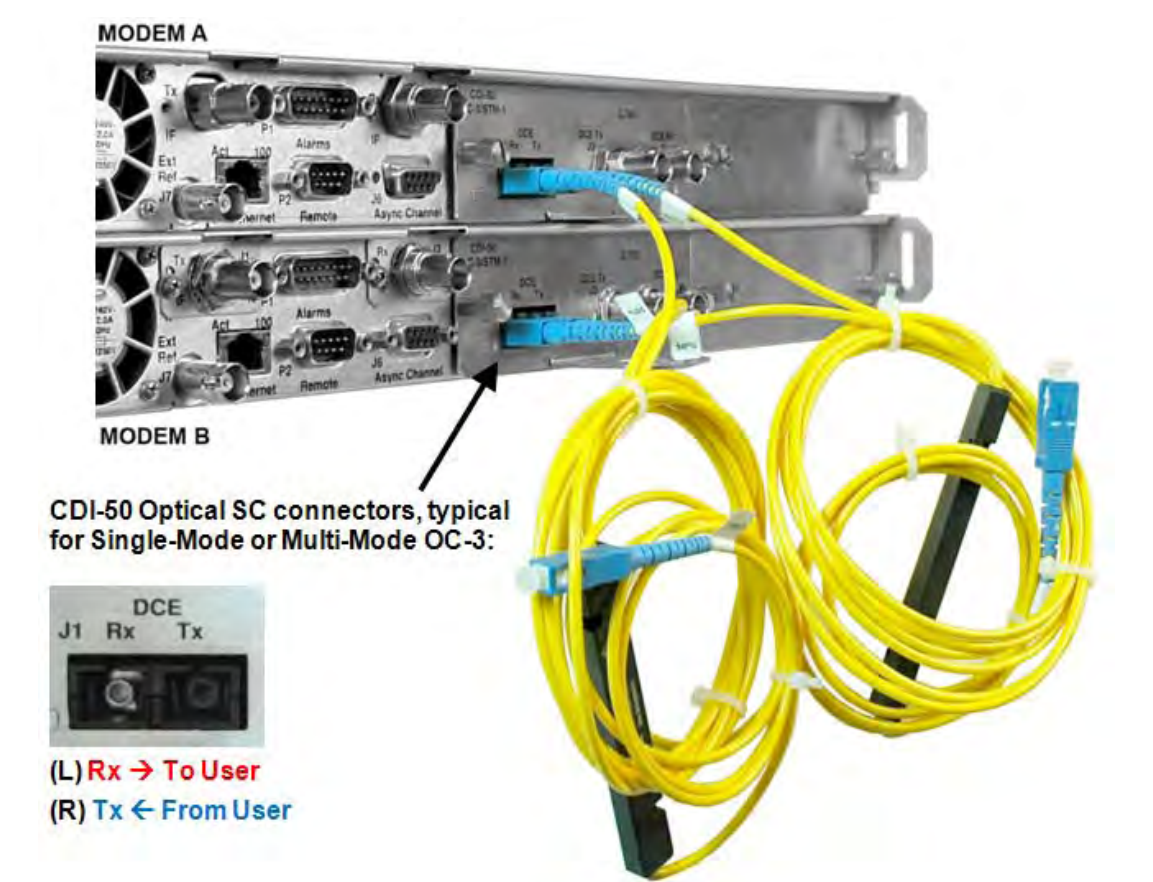
KT/12583 155MB Copper (CDI-50) Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 5-56. CDM-700 CDI-50 155MB Copper 1:1 Example

5.10.2.1.3 OC-3 Data Interface (CDI-50) Kits KT/12585 (Single-Mode) or KT/12584 (Multi-Mode)

Figure 5-57 shows a CDM-700 1:1 modem configuration with installation of one CDI-50 data interface installed in Slot 1 for use with OC-3 data, with Slot 2 empty. This figure shows installation of one KT/12585 OC-3 Single-Mode Interface Kit. Multi-Mode configurations use the KT/12584 OC-3 Multi-Mode Interface kit. You must use the cable kit that is specific to *Single Mode* or *Multi Mode* operation:

- The KT/12585 OC-3 Single-Mode Interface Kit features **yellow** cables.
- The KT/12584 OC-3 Multi-Mode Interface Kit features **orange** cables.



KT/12585 OC-3 Single-Mode (CDI-50) Interface Kit		
CEFD Part No.	Qty	Description
PP/CPS2A12501	2	Cable Assy – RoHS-Compliant, Optical Coupler, SC/UPC Connectors

OR

KT/12584 OC-3 Multi-Mode (CDI-50) Interface Kit		
CEFD Part No.	Qty	Description
PP/CPM6A1250	2	Cable Assy – RoHS-Compliant, Optical Coupler, SC/UPC Connectors

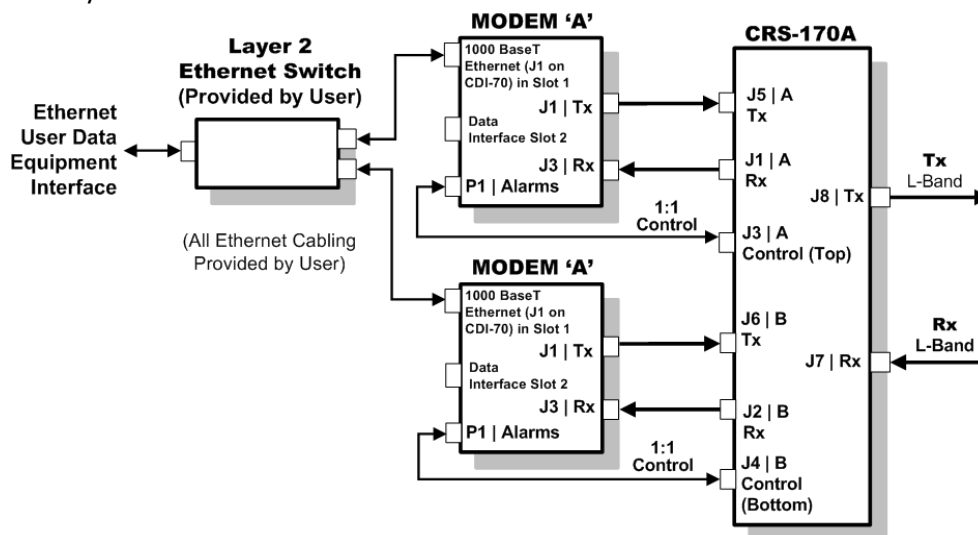
Figure 5-57. CDM-700 CDI-50 OC-3 1:1 Example (Single-Mode shown)

5.10.2.2 Gigabit Ethernet Data Interface (CDI-70) Example



See CEFD White Paper “Bridged Ethernet Interface Redundancy” available for download from Comtech EF Data’s Web site (www.comtechefdata.com).

Figure 5-58 shows the block diagram and cabling example for a CDM-700 1:1 modem configuration with the CDI-70 Gigabit Ethernet data interface installed in Slot 1, with Slot 2 empty. This setup requires no cabling and component kit – you must use user-provided Ethernet cables and Layer 2 Switch for direct connection to the CDI-70.



CDM-700 Block Diagram – CDI-70 Gigabit Ethernet Interface

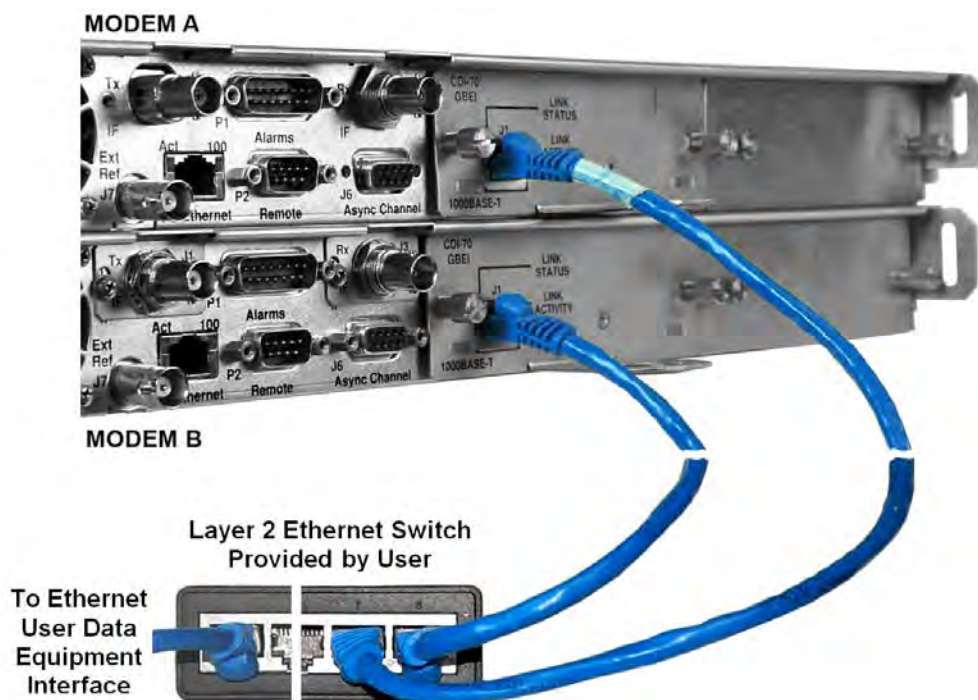


Figure 5-58. CDM-700 CDI-70 Gigabit Ethernet 1:1 Example

5.11 Cabling the CDM-600L (CLM-9600L)



1) For information on configuring the CRS-170A L-Band 1:1 Redundancy Switch with the CDM-600L (CLM-9600L) Open Network Satellite Modems for 1:1 operation, see:

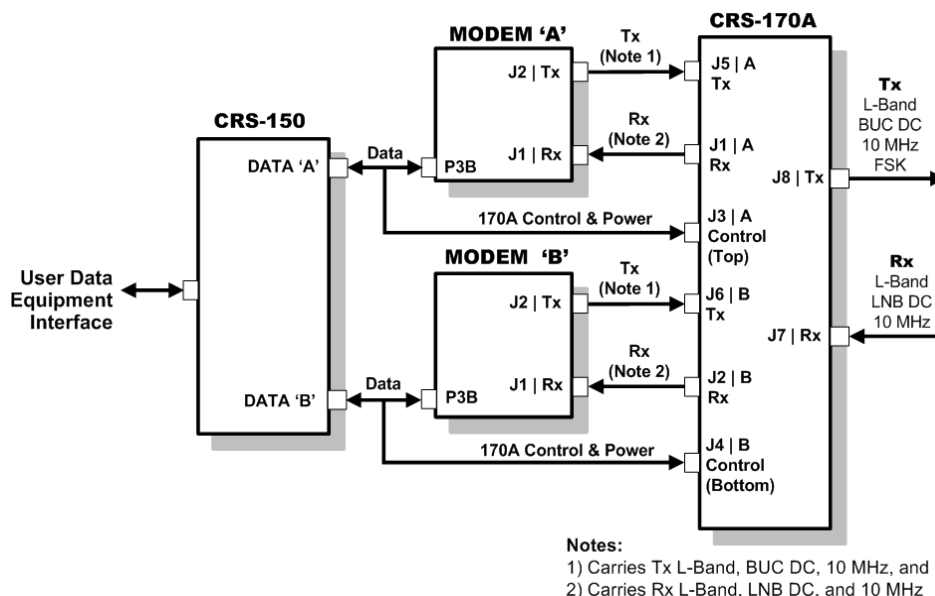
- Chapter 4. MODEM AND SWITCH CONFIGURATION
- CLM-9600L Open Network Satellite Modem Installation and Operation Manual (CEFD P/N MN/CLM9600L.IOM)
- CRS-150 1:1 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/CRS150.IOM)

2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

Figure 5-59 shows the block diagram for connecting a pair of CDM-600L (CLM-9600L) Open Network Satellite Modems together with the CRS-150 and CRS-170A switches. This figure also provides a table that identifies the cable assemblies that may be supplied with the CRS-170A in this configuration.



When you connect the Control Interface cables between the CRS-170A, the CRS-150, and the modems, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR10456-4	2	Cable – 1:1 Y-Splitter, Data/Control, DB-25M → DB-25M, 4' / DB-9M, 1'
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 5-59. CDM-600L (CLM-9600L) Block Diagram – Cable Connections

[illegible]

5.12 Cabling the SDM-300L3



- 1) For information on configuring the CRS-170A L-Band 1:1 Redundancy Switch with the SDM-300L3 Satellite Modems for 1:1 operation, see:

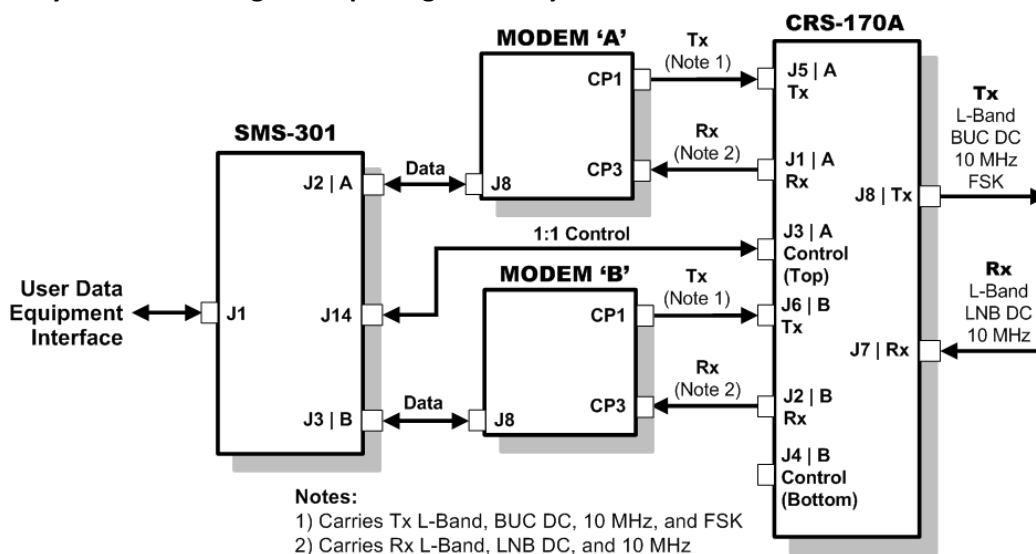
- Chapter 4. MODEM AND SWITCH CONFIGURATION
- SDM-300L3 Satellite Modem Installation and Operation Manual (CEFD P/N MN/SDM300L3.IOM)
- SMS-301 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/SMS301.IOM)

- 2) For information on the cables and cable assemblies specified in this section, see Appendix A. CABLE DRAWINGS.

Figure 5-60 shows the block diagram for connecting a pair of SDM-300L3 Satellite Modems together with the SMS-301 and CRS-170A switches. This figure also provides a table that identifies the cable assemblies that may be supplied with the CRS-170A in this configuration. The other cables between the SMS-301 and the SDM-300L3 are the same as are supplied with the SMS-301 in an SDM-300A application.



When you connect the Control Interface cables between the CRS-170A, the SMS-301, and the modems, make sure that you securely fasten the screw locks on the Type 'D' connectors. This prevents accidental disconnection of the cables, particularly when you are removing and replacing a standby unit.



CEFD Part No.	Qty	Description
CA/WR10163-1	1	Cable – Control, SMS-301 → CRS-170A, DB-15M → DB-9M, 4'
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50 Ω Type 'N', 4'

Figure 5-60. SDM-300L3 Block Diagram – Cable Connections

[illegible]

Appendix A. CABLE DRAWINGS

A.1 Overview

This appendix provides technical specification drawings for the cables used with the CRS-170A L-Band 1:1 Redundancy Switch. These cable details are grouped into two categories – **Control Interface Cables (Sect. A.2)**, and **IF/Data Interface Cables (Sect. A.3)**.



The European EMC Directive (EN55022, EN50082-1) requires that you use properly shielded cables for DATA I/O. These cables must be double-shielded from end-to-end, ensuring a continuous ground shield.



The tables in Sections A.2 and A.3 cross-reference the modem-specific cabling figures featured in Chapter 5. CABLES AND CONNECTIONS.

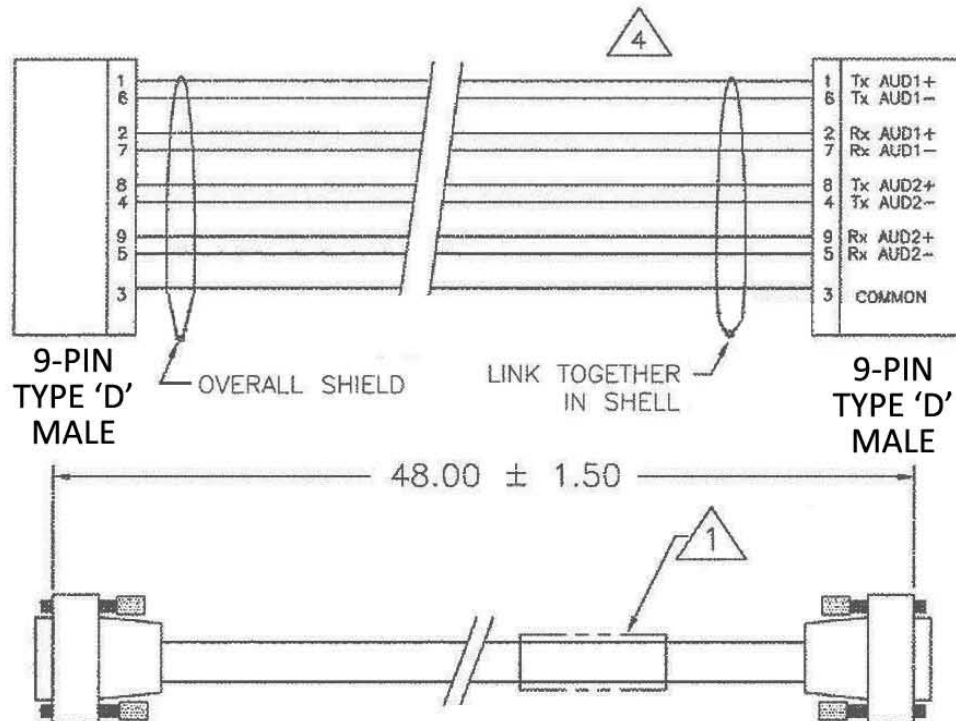
A.2 Control Interface Cables

App. A FIG	CABLE CEFD P/N	DESCRIPTION	USED FOR (TYPE)	USED WITH CRS-170A →	REF Ch. 5 FIG
A-1	CA/WR9378-4	Universal Cable, Control DB-9M → DB-9M, 4' Alternate Cabling Note: CEFD Universal Control Cable CA/WR9378-8 (DB-9M → DB-9M, 8'), sold separately, is available for use in place of CA/WR9378-4	1:1 Control	CDM-625/A	5-1
				CDM-850	5-18
				CDM-840	5-23
				CDM-760/CDM-750	5-27
				CDM-570L/AL	5-33
A-2	CA/WR12135-1	Adapter Cable, Control, RoHS, DB-15F → DB-9M, 6'	1:1 Control	CDM-710GL	5-40
				CDM-710	5-46
				CDM-700	5-52
A-3	CA/WR13011-4	Optional Adapter Cable, Control 'Y' Splitter, DB-15F → DB-9M (4'), DB-9M (6") (Alternate to CA/WR12135-1)	1:1 Control, Summary Fault Relay	CDM-710GL	5-40
				CDM-710	5-46
				CDM-700	5-52
A-4	CA-0000187	Optional Cable, Control, Non-muting, DB-15F → DB-9M, 6' (Alternate to CA/WR12135-1)	1:1 Control (Non-mute Tx IF)	CDM-710GL	5-40
				CDM-710	5-46
				CDM-700	5-52
A-5	CA/WR10456-4	Control/Data Cable, Y-Splitter, DB-25M → DB-25M (4'), DB-9M (1')	1:1 Data/Control	CDM-600L (CLM-9600L) → CRS-150	5-59
A-6	CA/WR10163-1	Control Cable, DB-15M → DB-9M, 4'	1:1 Control	SDM-300L3 → SMS-301	5-60

A.2.1 Switch-to-Modem, Universal Control Cable (DB-9M→DB-9M)



Alternate Cabling Note: CEFD Universal Control Cable CA/WR9378-8 (DB-9M → DB-9M, 8'), sold separately, is available for use in place of CA/WR9378-4



INDICATORS		
9M	NOTES	9M
1	TO	1
2	TO	2
3	TO	3
4	TO	4
5	TO	5
6	TO	6
7	TO	7
8	TO	8
9	TO	9

NOTES: UNLESS OTHERWISE SPECIFIED:

1. IDENTIFY CABLE PART NUMBER AND REV LEVEL USING LABEL OR STICKER.
2. REFER TO MN/4905 FOR DETAILED INSTRUCTIONS REGARDING EMI ASSEMBLY PROCESS.
3. ENSURE SHIELDING FOIL AND/OR BRAID IS BONDED TO METAL BACKSHELL FOR EMI SHIELDING.
4. PAIR UP TWISTED PAIRS AS SHOWN ON DRAWING. WIRE REMAINING TWISTED PAIRS STRAIGHT THRU.

Figure A-1. Universal Control Cable (CA/WR9378-4)

A.2.2 Switch-to-Modem, Adapter Control Cable, RoHS (DB-9M→DB-15F)

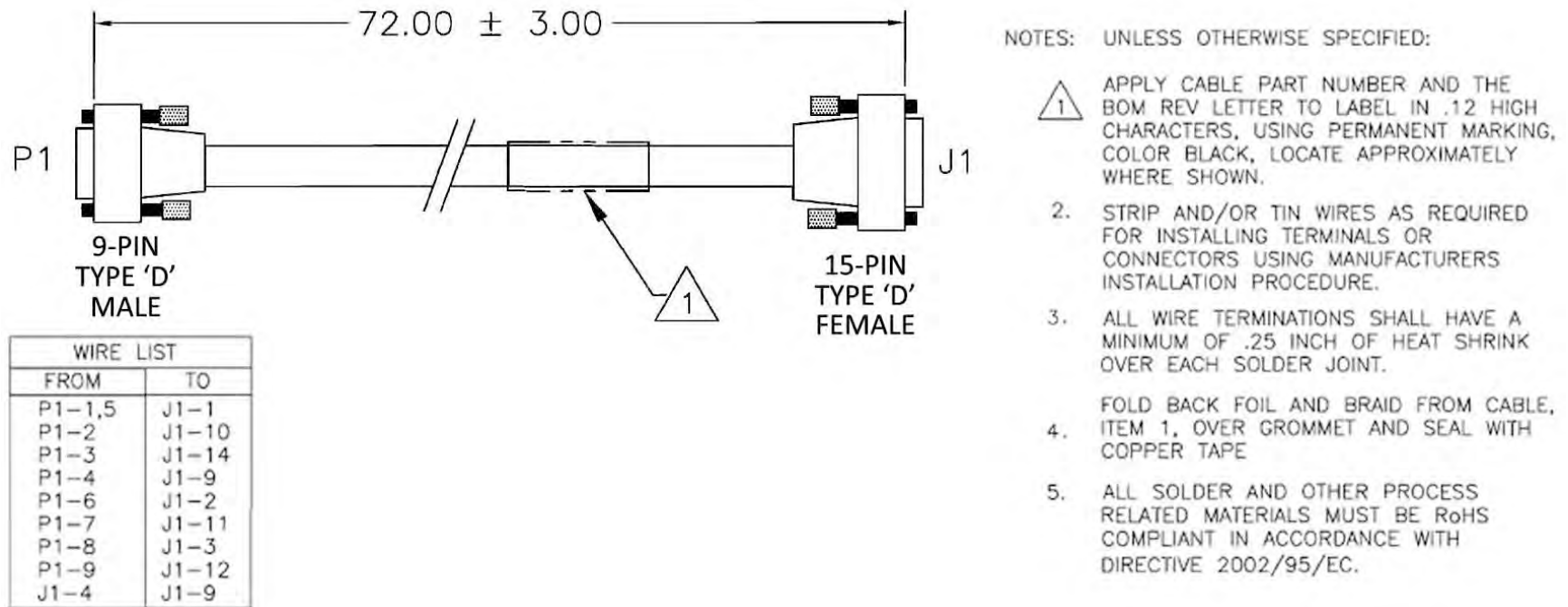


Figure A-2. Adapter Control Cable (CA/WR12135-1)

A.2.3 Switch-to-Modem, Optional 'Y' Splitter Adapter Control Cable ((2X) DB-9M→DB-15F)

You may purchase this optional CA/WR13011-4 'Y' Splitter Adapter Control Cable as a replacement for the CA/WA12135-1 cable. This cable permits user access to the Summary Fault Relay.

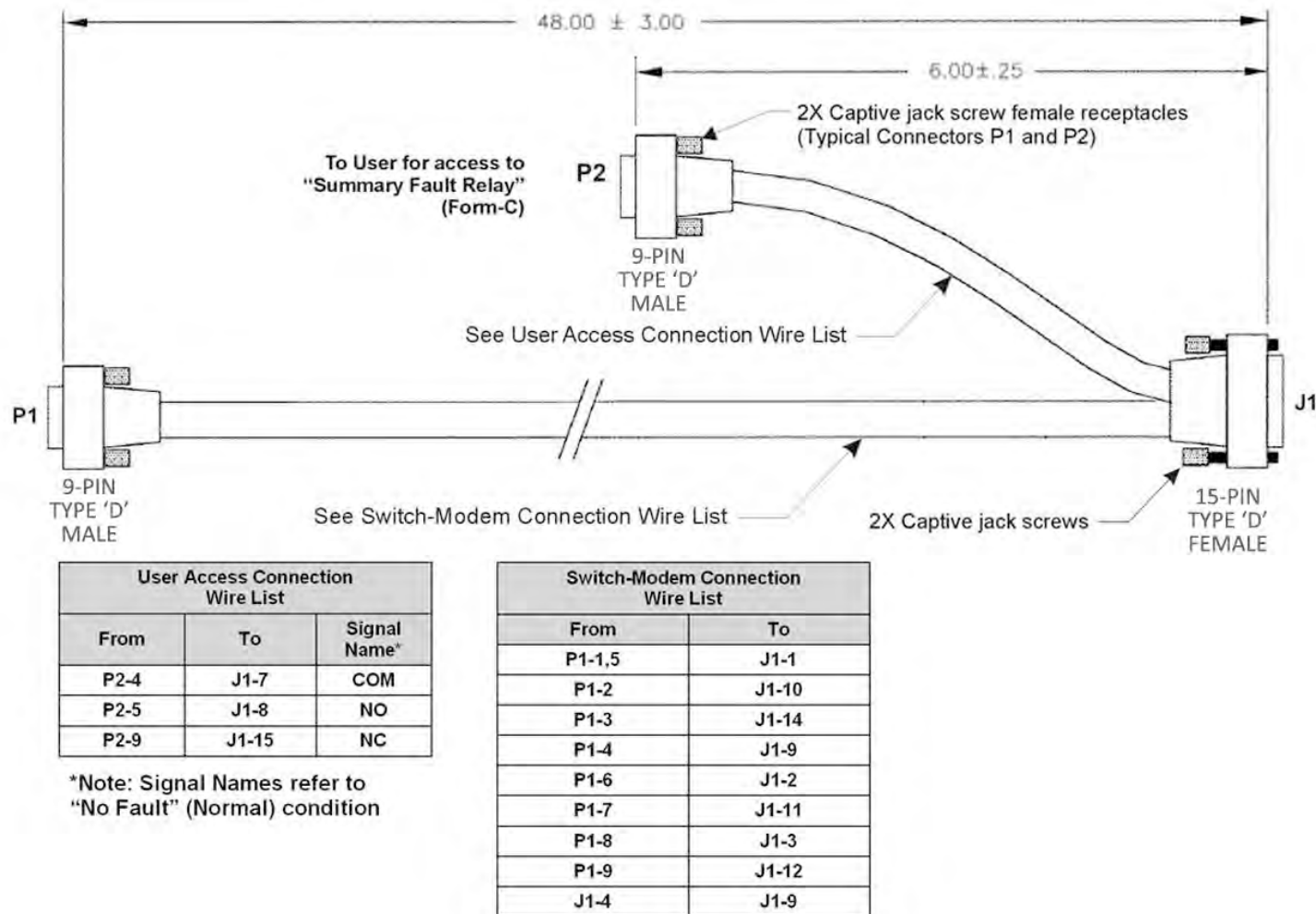


Figure A-3. Optional 'Y' Splitter Adapter Control Cable (CA/WR13011-4)

A.2.4 Switch-to-Modem, Optional Control Cable, Non-muting (DB-9M→DB-15F)

You may purchase this optional CA-0000187 Control Cable as a replacement for the CA/WA12135-1 cable. This cable keeps the offline modem's Tx IF-enabled.

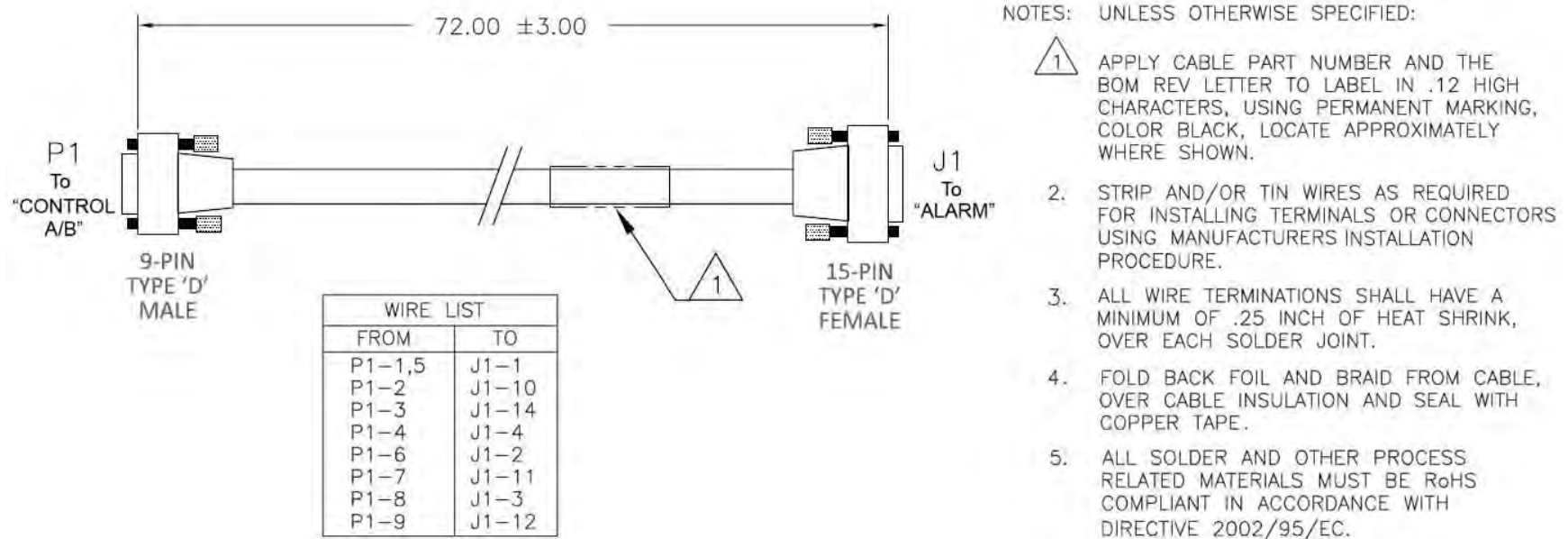
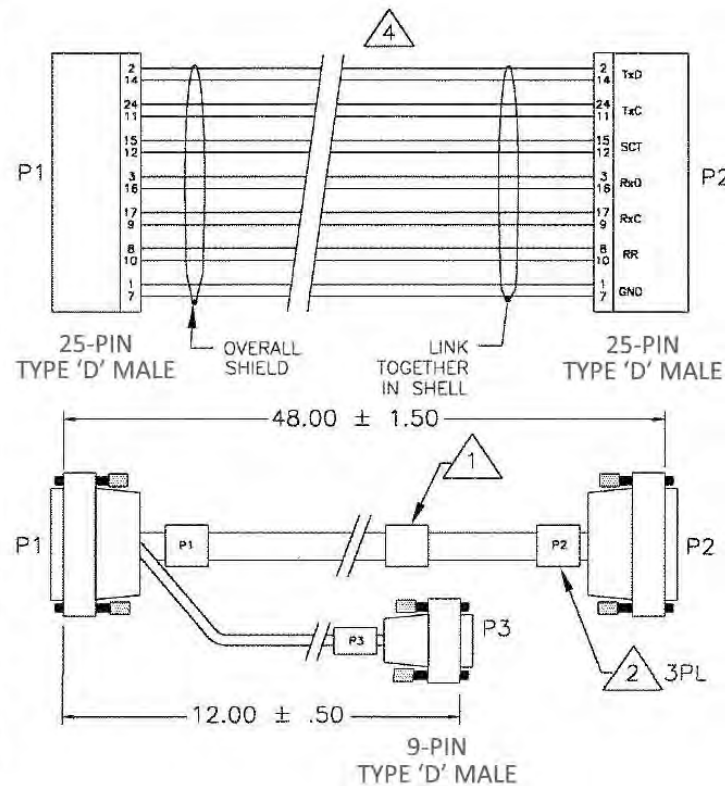


Figure A-4. Optional Control Cable (CA-0000187)

A.2.5 Modem-to-Switch (CRS-170A and CRS-150), Data / Control 'Y' Cable (DB-25M→DB-25M, DB-9M)

INDICATORS			
25M	NOTES	25M	9M
1	TO	1	1
2	TO	2	
3	TO	3	
4	TO	4	
5	TO	5	
6	TO	6	
7	TO	7	5
8	TO	8	
9	TO	9	
10	TO	10	
11	TO	11	
12	TO	12	
13	TO	13	
14	TO	14	
15	TO	15	
16	TO	16	
17	TO	17	
18	TO	18	9
19	TO	19	
20	TO	20	
21	TO	21	
22	TO	22	
23	TO	23	7
24	TO	24	
25	TO	25	



NOTES: UNLESS OTHERWISE SPECIFIED:

1. APPLY CABLE PART NUMBER AND THE BOM REV. LETTER TO LABEL IN .12 HIGH CHARACTERS USING PERMANENT MARKING, COLOR BLACK. LOCATE APPROXIMATELY WHERE SHOWN.
2. MARK TERMINATION ENDS IN .12 HIGH CHARACTERS USING PERMANENT MARKING, COLOR BLACK. LOCATE APPROXIMATELY WHERE SHOWN.
3. ENSURE SHIELDING FOIL AND/OR BRAID IS BONDED TO METAL BACKSHELL FOR EMC SHIELDING.
4. PAIR UP TWISTED PAIRS AS SHOWN ON DRAWING. WIRE REMAINING TWISTED PAIRS STRAIGHT THRU.
5. USE METAL BACKSHELLS FOR D TYPE CONNECTORS.
6. ALL SOLDER AND OTHER PROCESS RELATED MATERIALS MUST BE RoHS COMPLIANT PER DIRECTIVE 2002/95/EC.

Figure A-5. Data / Control 'Y' Cable (CAWR10456-4)

A.2.6 Modem-to-Switch (CRS-170A and SMS-301), Control Cable (DB-9M→DB-15M)

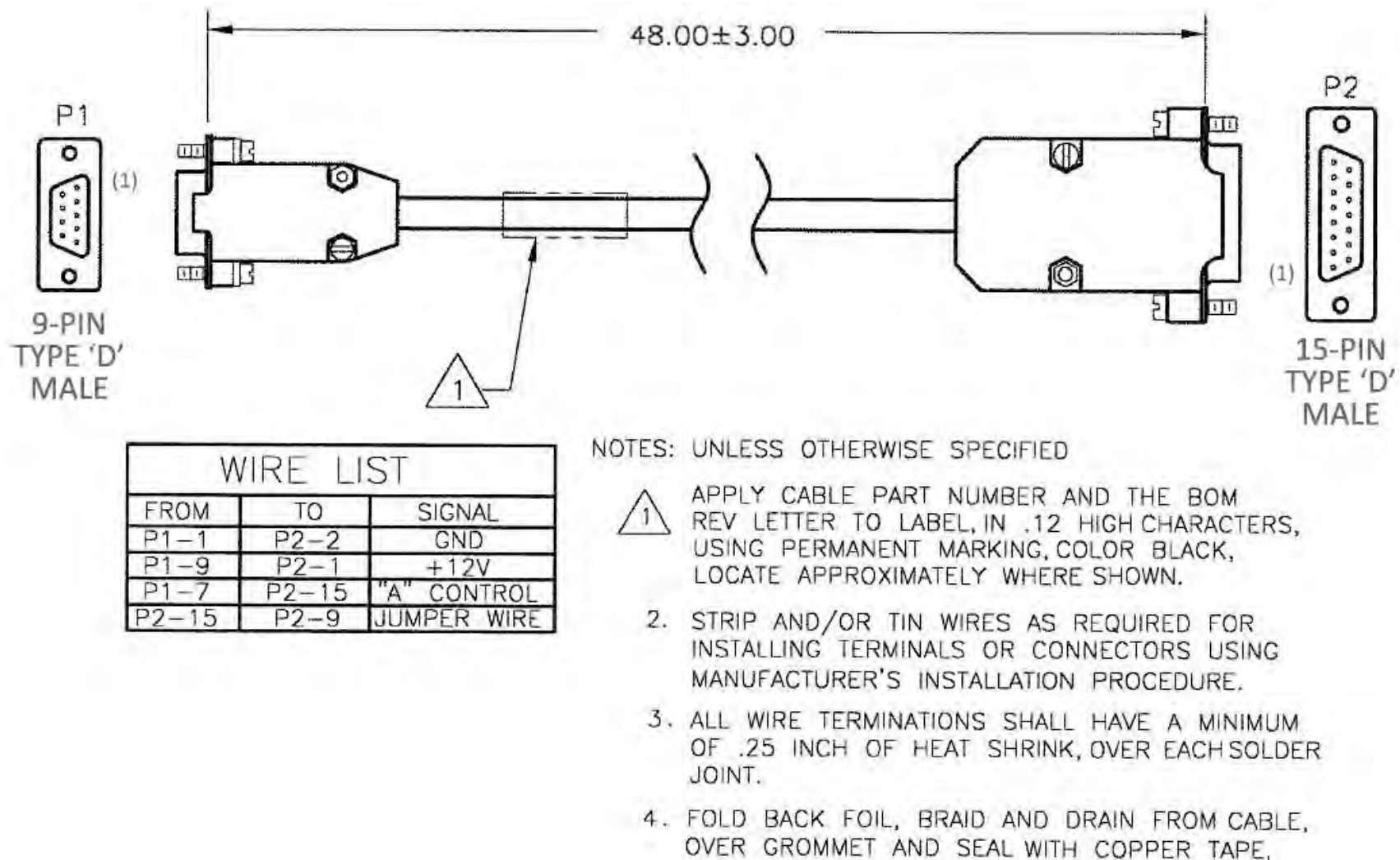


Figure A-6. Control Cable (CA/WR10163-1)

Notes

[illegible]

A.3 IF / Data Interface Cables

App. A FIG	CABLE CEFD P/N	DESCRIPTION	USED FOR (TYPE)	USED WITH CRS-170A →	REF Ch. 5 FIG
A-7	CA/RF10453-4	RoHS Coax Cable, Type 'N' 50Ω, 4'	Modem → Switch IF Interface	CDM-625/A	5-2
					5-3
				CDM-850	5-19
				CDM-840	5-24
				CDM-760/CDM-750	5-28
				CDM-570L/AL	5-34
				CDM-710GL	5-41
				CDM-710	5-47
				CDM-700	5-53
A-8	CA/BNC75OHM	RoHS Coax Cable, Type 'BNC' 75Ω, 1'	Modem → Switch IF Interface	CDM-600L (CLM-9600L)	5-59
				SDM-300L3	5-60
				CDM-625/A	5-3
				G.703 Unbalanced Data Interface	5-9
				ASI Data Interface	5-10
				G.703 E1 Unbalanced Data Interface	5-26
				Single G.703 E3/T3 PIIC Data Interface	5-32
				G.703 Unbalanced Data Interface	5-38
				Single G.703 E3/T3/STS-1 Data Interface	5-43
A-9	CA/RB10461-1	1:1 Y-Splitter Cable, DB-25F (1") → (2X) DB-25M (4")	ASI Data Interface	CDM-710	5-49
			Dual G.703 E3/T3/STS-1 Data Interface	CDM-700	5-55
			155MB Copper Data Interface	CDM-700	5-56
A-10	CA-0000071	1:1 'Y' Splitter Cable, (2X) DB-9M → DB-9F, 8"	EIA-422/232, V.35 Data Interfaces	CDM-625/A	5-5
			HSSI Data Interface	CDM-625/A	5-6
			EIA-422/232 Data Interface	CDM-570L/AL	5-36
A-11	CA-0000163	Cable Assy – Optional 1:1 'Y' Splitter, (2X) DB-15F → DB-9M, 6"	Quad E1 Data Interface	CDM-625/A	5-7
			G.703 Balanced Data Interface	CDM-625/A	5-8
			ESC Data Interface	CDM-625/A	5-12
A-12	CA-0000164	Cable Assy – Optional 1:1 'Y' Splitter, (2X) RJ-48F → DB-9M, 6"	Quad E1 Data Interface	CDM-625/A	5-7
A-13	KT-0000122	Cable Assy – Optional 1:1 'Y' Splitter, (4X) BNC → DB-9M, 6"	Quad E1 Data Interface	CDM-625/A	5-7
A-14	CA-0000070	1:1 'Y' Splitter Cable, (2X) HD-44M → HD-44F, 8"	Overhead Data Interface	CDM-625/A	5-11
A-15	CA-0000276	Shielded Multi-drop CnC® Plus Cable, 1:1, DB-9M → DB-9M, 1'	PMSI/CnC® Data Interface	CDM-625/A	5-17

App. A FIG	CABLE CEFD P/N	DESCRIPTION	USED FOR (TYPE)	USED WITH CRS-170A →	REF Ch. 5 FIG
A-16	CA-0000560	RoHS Cable Assy – Optical Coupler, 2m (6.56'), Type 'LC' Connectors	Optical Gigabit Ethernet Single-Mode Data Interface	CDM-760/CDM-750	5-30
	CA-0000559	RoHS Cable Assy – Optical Coupler, 2m (6.56'), Type 'LC' Connectors	Optical Gigabit Ethernet Multi-Mode Data Interface	CDM-760/CDM-750	5-30
A-17	CA/WR10522-1	1:1 'Y' Splitter Cable, (2X) DB-15M → DB-15F, 5"	G.703 Balanced Data Interface	CDM-570L/AL	5-37
A-18	PP/SC3523	RoHS Cable Assy – HSSI 'Y' Splitter, (2X) HD-50M → HD-50F, 3"	HSSI Data Interface	CDM-710GL	5-44
				CDM-710	5-50
				CDM-700	5-55
A-19	PP/CPS2A12501	RoHS Cable Assy – Optical Coupler, 7' Type 'SC/UPC' Connectors	OC-3 Single-Mode Data Interface	CDM-700	5-57
	PP/CPM6A1250	RoHS Cable Assy – Optical Coupler, 7' Type 'SC/UPC' Connectors	OC-3 Multi-Mode Data Interface		5-57

A.3.1 Switch-to-Modem / Modem-to-User, L-Band Coaxial Cable, RoHS, Type 'N' 50Ω

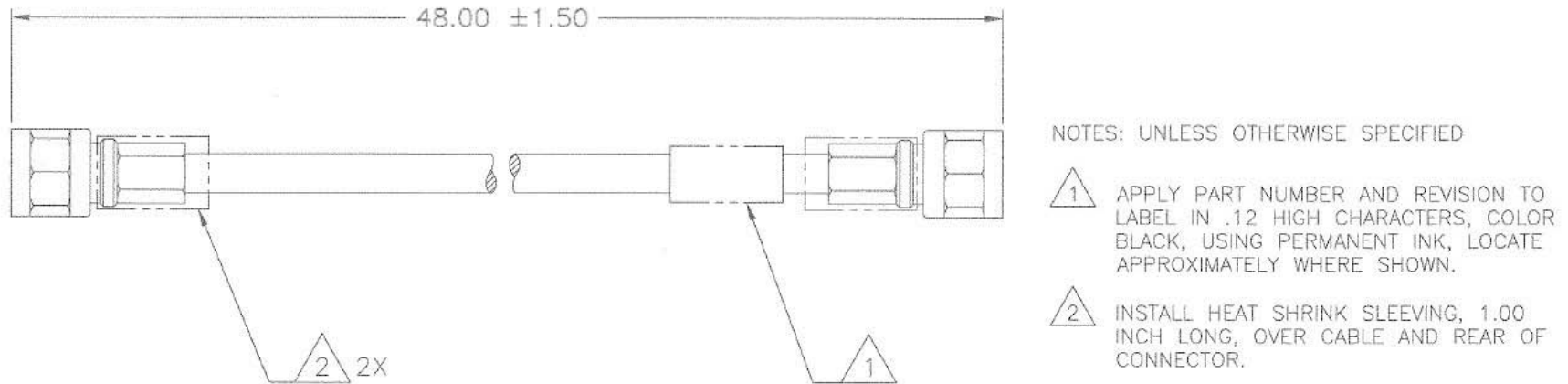


Figure A-7. Tx/Rx 50Ω Type 'N' Coaxial Cable (CA/RF10453-4)

A.3.2 Switch-to-Modem / Modem-to-User, 70/140 MHz Coaxial Cable, RoHS, Type 'BNC' 75Ω

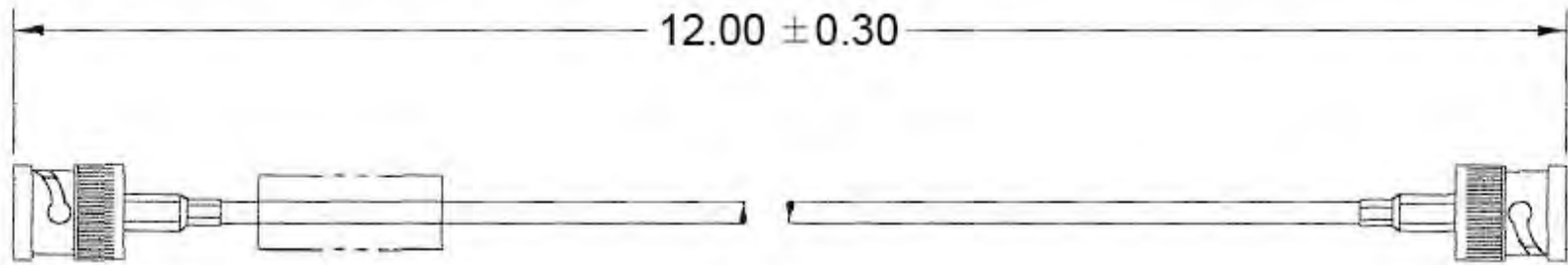
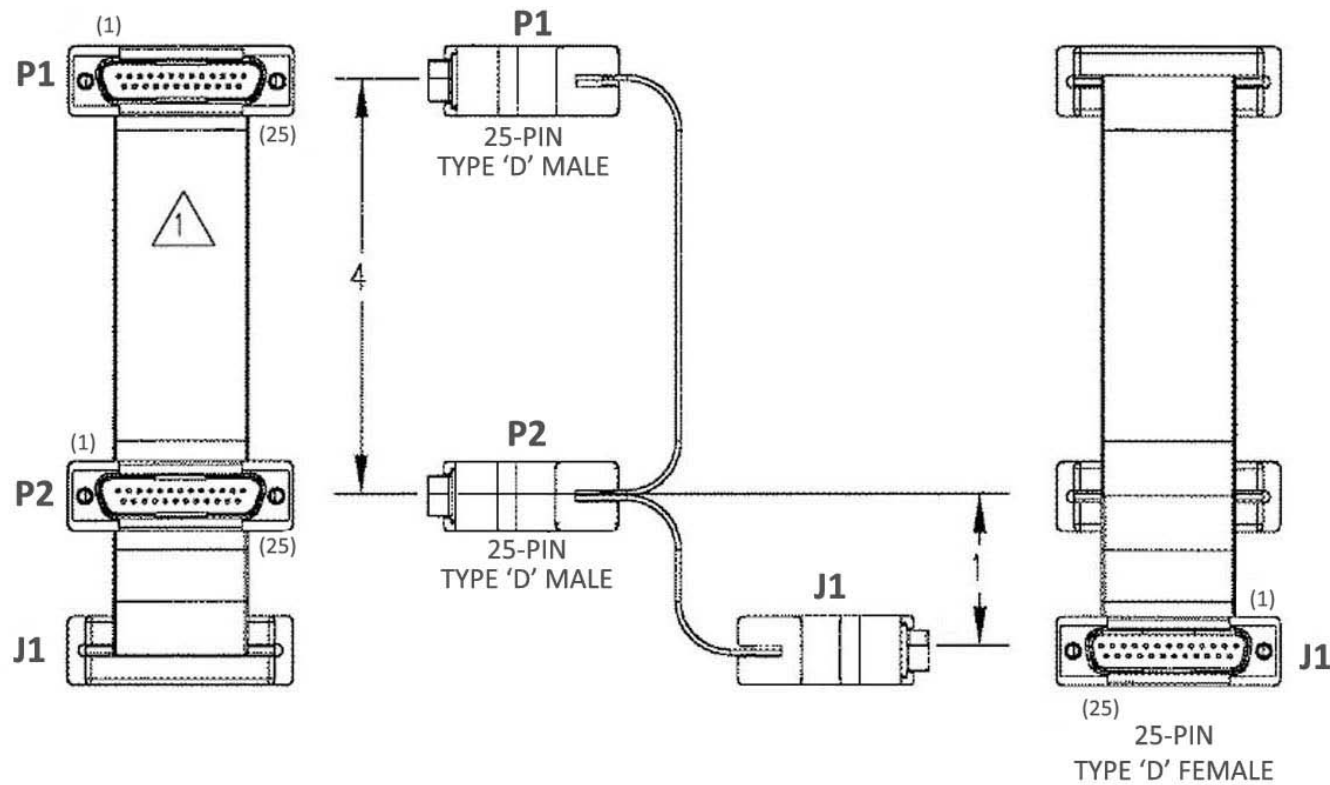


Figure A-8. Tx/Rx/User Data 75Ω Type 'BNC' Coaxial Cable (CA/BNC75OHM)

A.3.3 Modem-to-User, Splitter Cable (DB-25F→(2X) DB-25M)



NOTES: UNLESS OTHERWISE SPECIFIED.

1. APPLY CABLE PART NUMBER AND REVISION LEVEL FROM PARTS LIST IN .12 HIGH CHARACTERS USING PERMANENT MARKING. LOCATE APPROX. WHERE SHOWN.
2. ALL SOLDER AND OTHER PROCESS RELATED MATERIALS MUST BE RoHS COMPLIANT PER DIRECTIVE 2002/95/EC.

Figure A-9. 1:1 User Data Splitter Cable (CA/RB10461-1)

A.3.4 Modem-to-User, CDM-625/A Data 'Y' Splitter Cable (DB-9F→(2X) DB-9M)

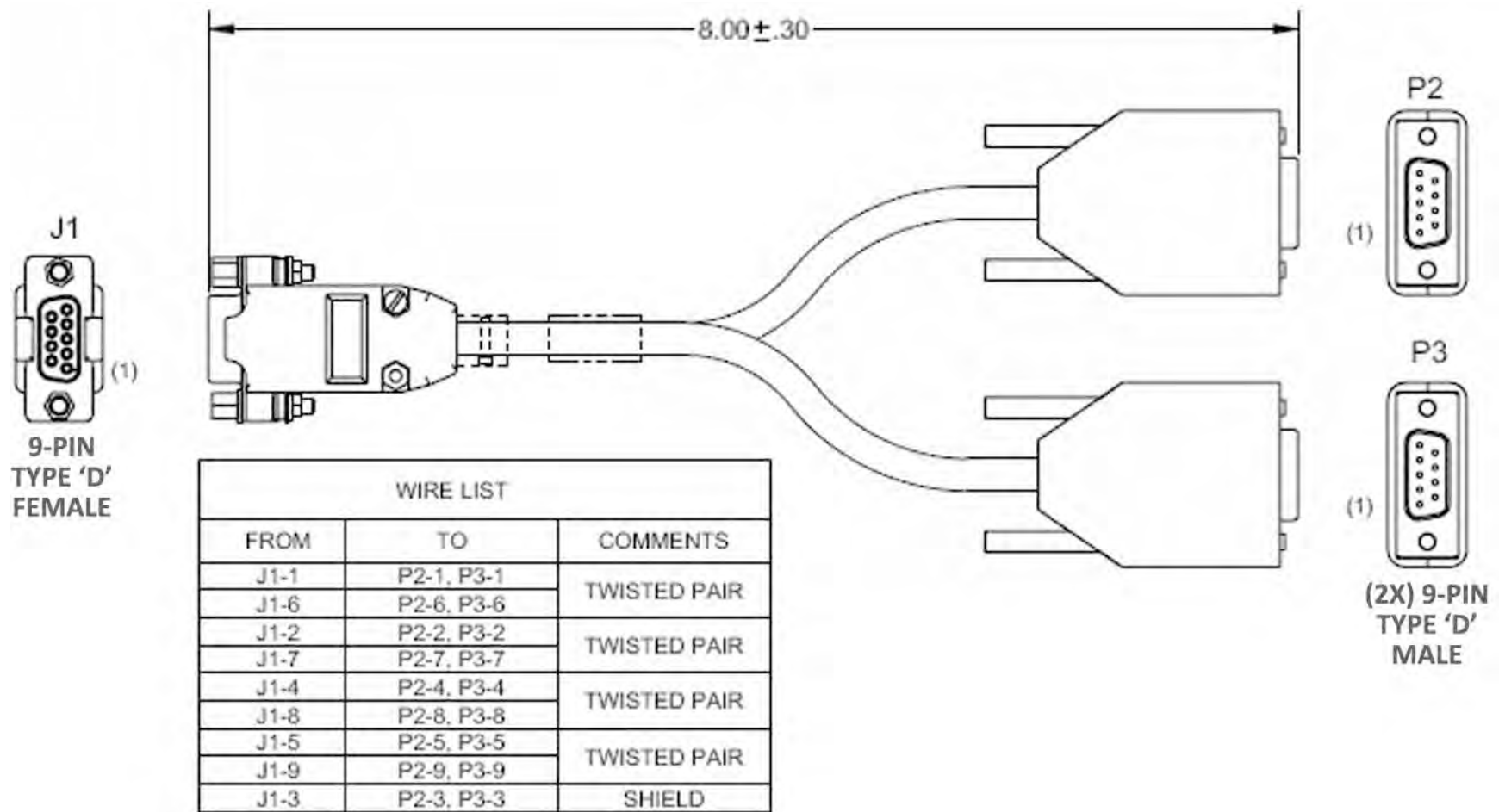


Figure A-10. 1:1 User Data 'Y' Splitter Cable (CA-0000071)

A.3.5 Modem-to-User, Quad E1 'Y' Splitter Adapter Cable (DB-9M→(2X) DB-15F)

You may purchase this optional adapter cable to adapt the Balanced G.703 or Auxiliary G.703 DB-9F modem connections to a DB-15F connector pair. The DB-9M end of this cable plugs into the 'To User' connector side (DB-9F) of the CA-0000071 'Y' Splitter cable shown in **Figure A-8**.

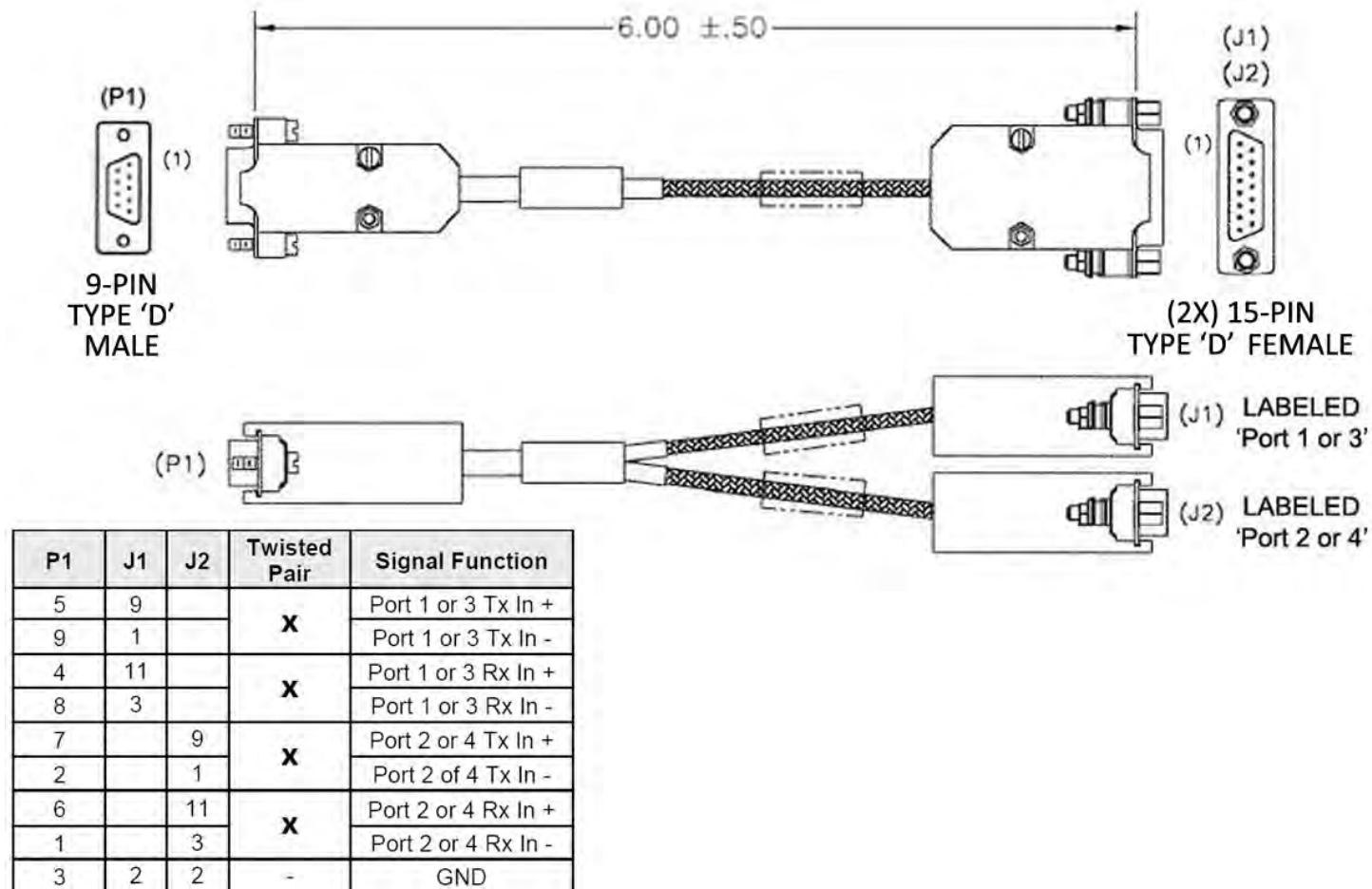


Figure A-11. Quad E1 User Data 'Y' Splitter Adapter Cable (CA-0000163)

A.3.6 Modem-to-User, Quad E1 'Y' Splitter Adapter Cable (DB-9M →(2X) RJ-48F)

You may purchase this optional adapter cable to adapt the Balanced G.703 or Auxiliary G.703 DB-9F modem connections to a RJ-48F connector pair. The DB-9M end of this cable plugs into the 'To User' connector side (DB-9F) of the CA-0000071 'Y' Splitter cable shown in **Figure A-8**.

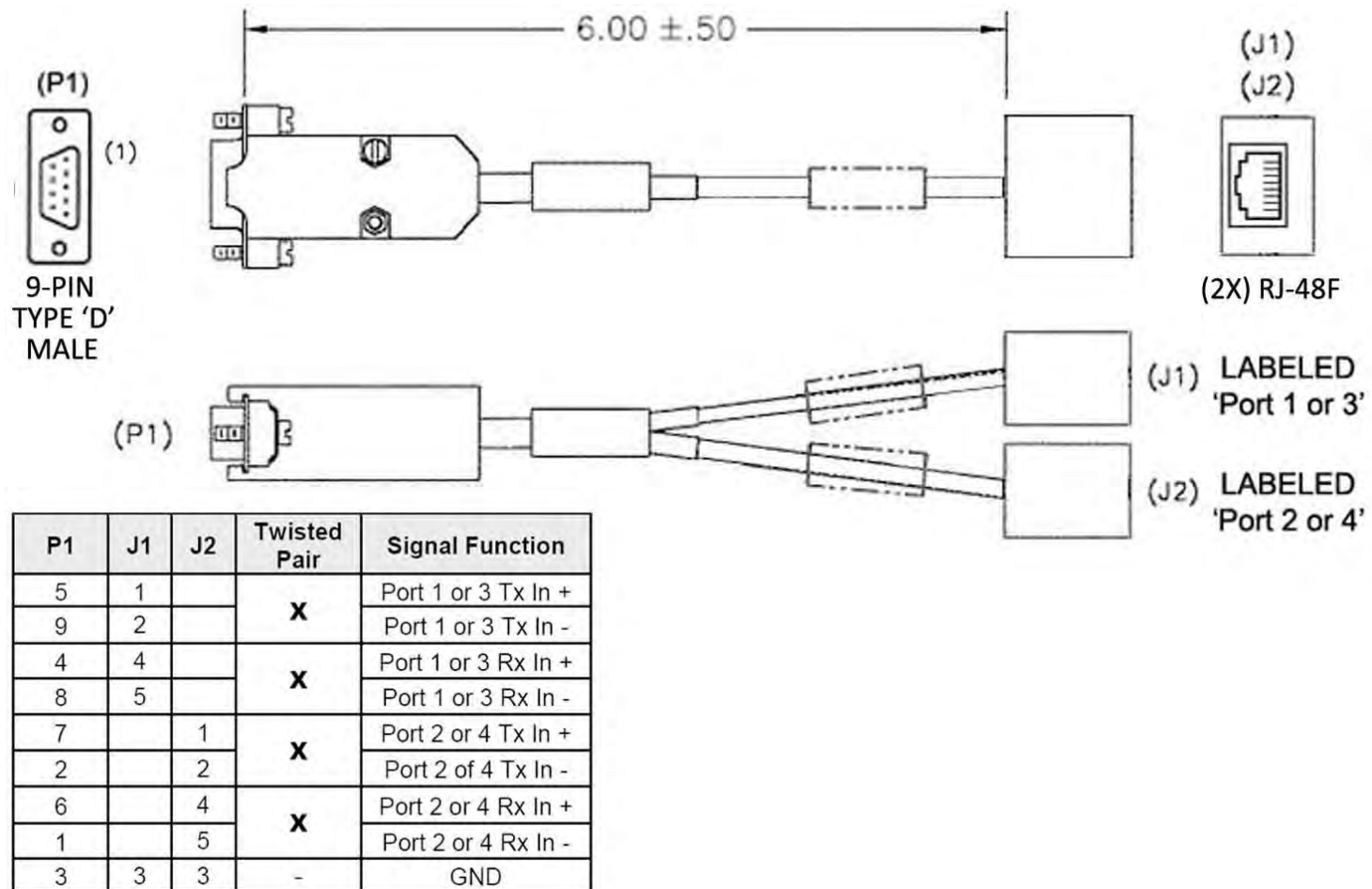
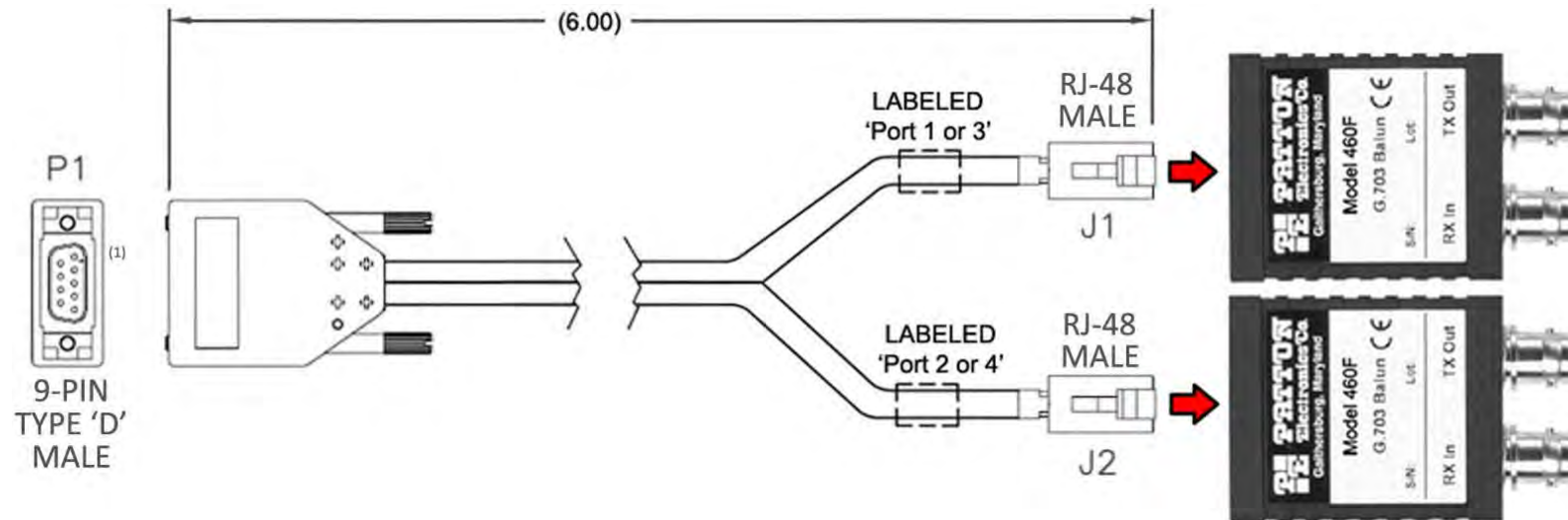


Figure A-12. Quad E1 User Data 'Y' Splitter Adapter Cable (CA-0000164)

A.3.7 Modem-to-User, Quad E1 ‘Y’ Splitter Adapter Cable Kit (KT-0000122)



KT-0000122 Quad E1 Balanced/Unbalanced Adapter Kit		
QTY	CEFD PART NO.	DESCRIPTION
1	CA-0000347	'Y' Cable Assy: DB-9M → 2X RJ-48 Male
2	502-0532-001	Bolun Adapter, 2X RJ-48 Female → 2X BNC 75Ω Female

CA-0000347 Connector Pinouts						
P1 PINOUTS				J1/ J2 TYPICAL WIRE CHART		
P1	J1	J2	Twisted Pair	Signal Function	PIN	WIRE COLOR
5	1		X	Port 1 or 3 Tx In +	1	WHITE / ORANGE STRIPE
9	2			Port 1 or 3 Tx In -	2	ORANGE
4	4		X	Port 1 or 3 Rx In +	3	WHITE / GREEN STRIPE
8	5			Port 1 or 3 Rx In -	4	BLUE
7		1	X	Port 2 or 4 Tx In +	5	WHITE / BLUE STRIPE
2		2		Port 2 or 4 Tx In -	6	GREEN
6		4	X	Port 2 or 4 Rx In +	7	WHITE / BROWN STRIPE
1		5		Port 2 or 4 Rx In -	8	BROWN
3	3	3	-	GND		

Figure A-13. Quad E1 User Data ‘Y’ Splitter Adapter Cable Kit (KT-0000122)

A.3.8 Modem-to-User, Overhead User Data 'Y' Splitter Cable (HD-44F→(2X) HD-44M)

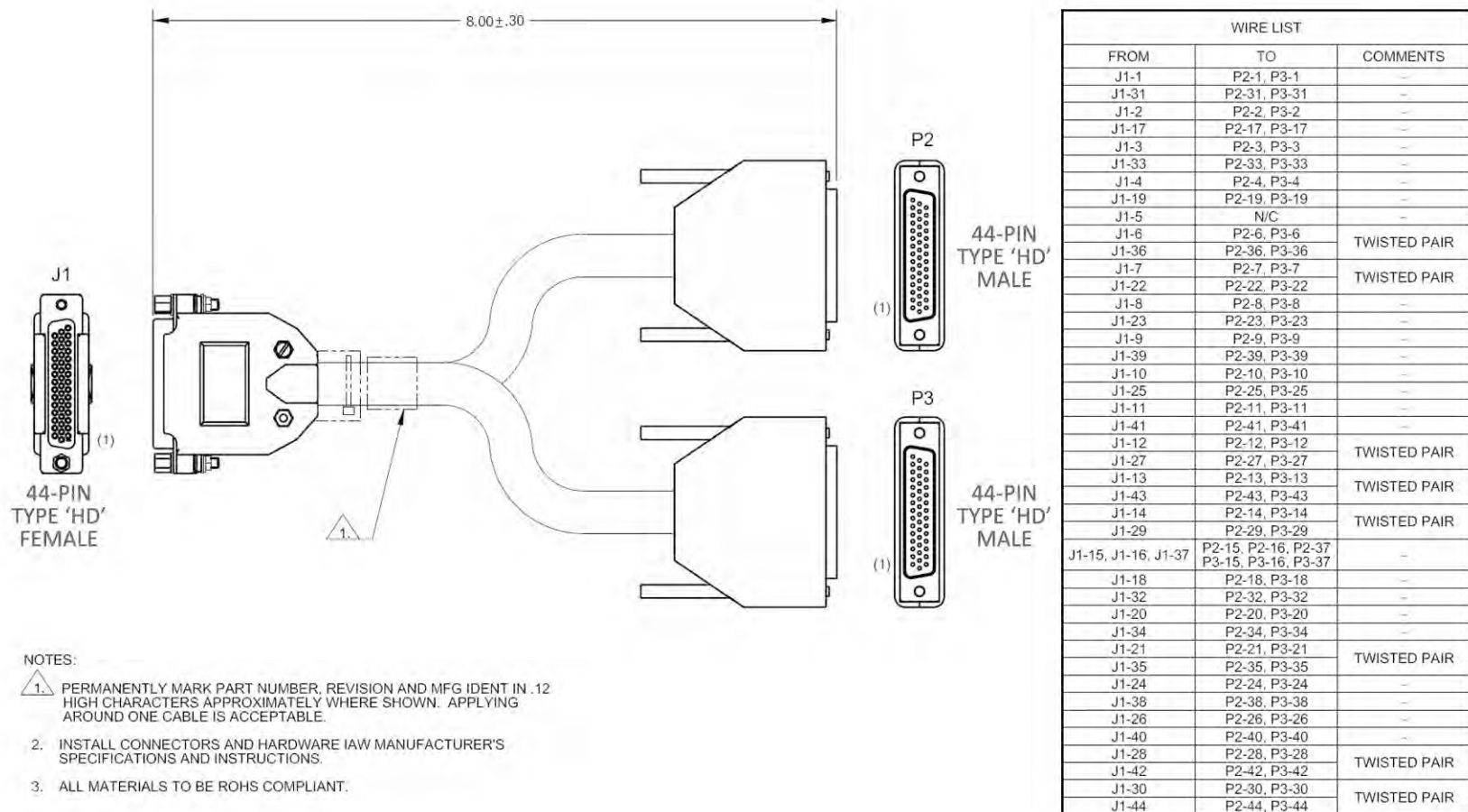


Figure A-14. Overhead User Data 'Y' Splitter Cable (CA-0000070)

A.3.9 Modem-to-Modem CDM-625/A CnC® Plus Shielded Multi-drop Cable (DB-9M→DB-9M)

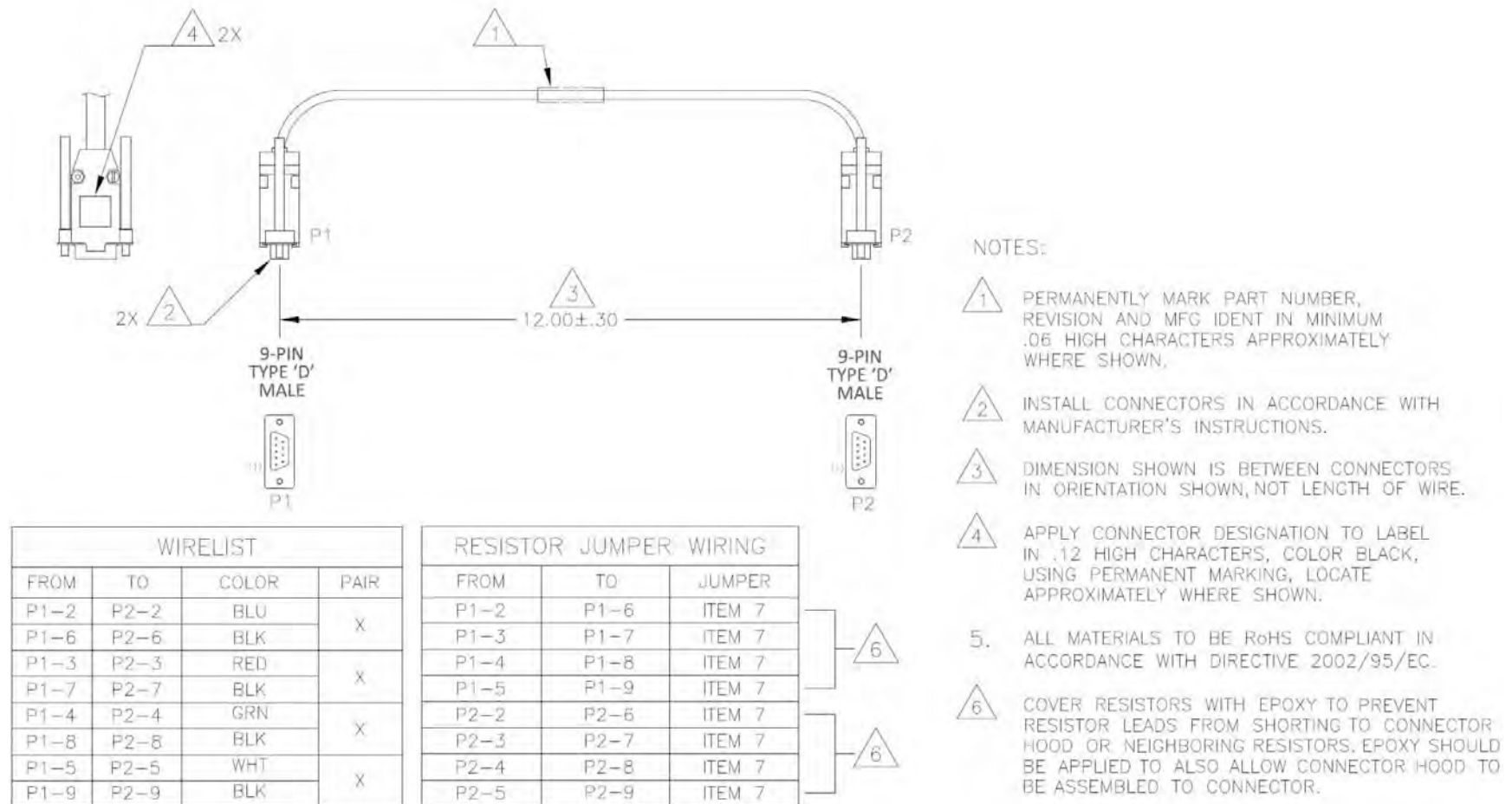


Figure A-15. CDM-625/A CnC® Plus Shielded Multi-drop Cable (CA-0000276)

A.3.10 Modem-to-User, RoHS Optical Gigabit Ethernet Cable Assemblies, Single-Mode OR Multi-Mode ((2X) Type 'LC'→(4X) Type 'LC')

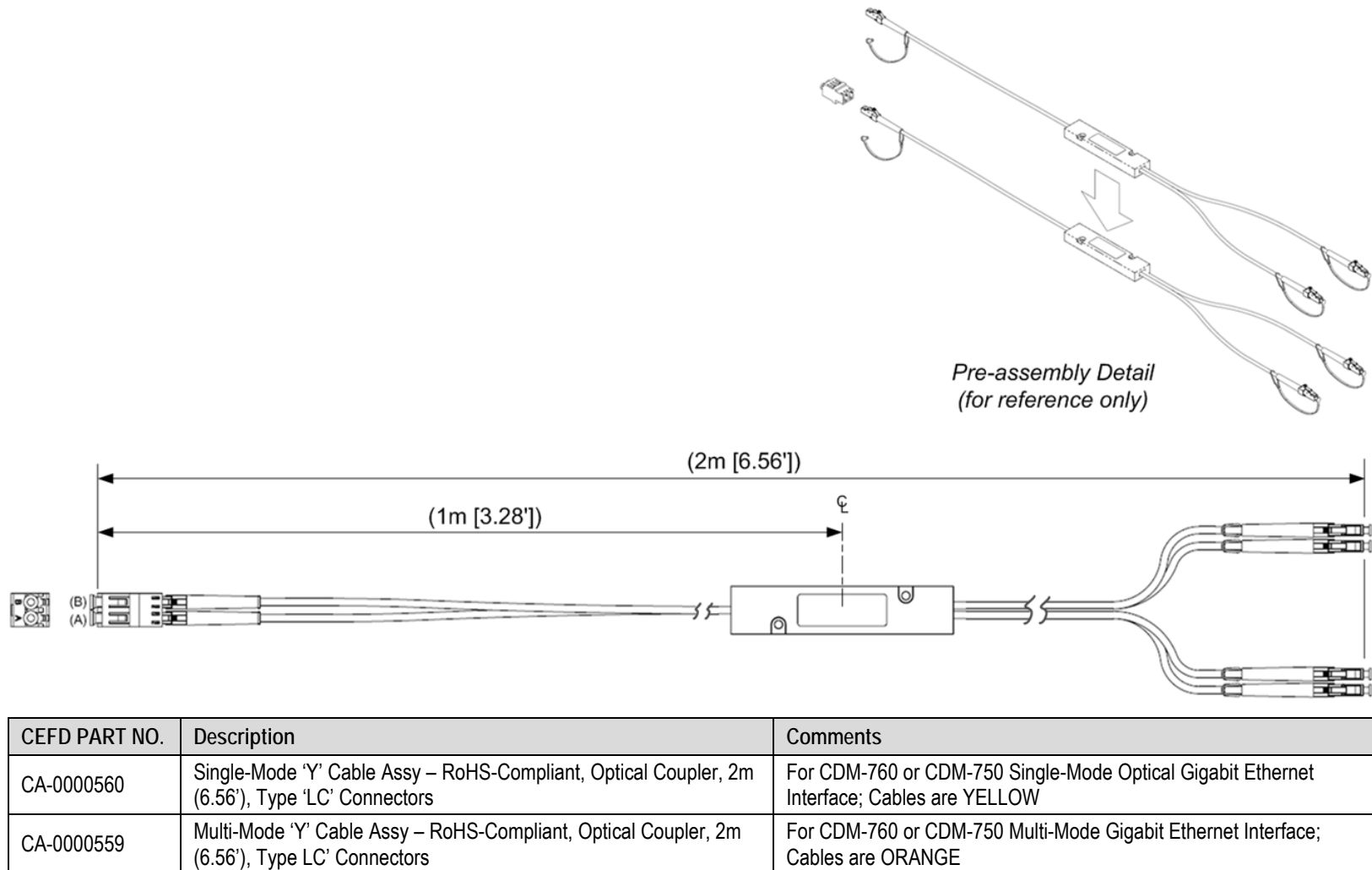
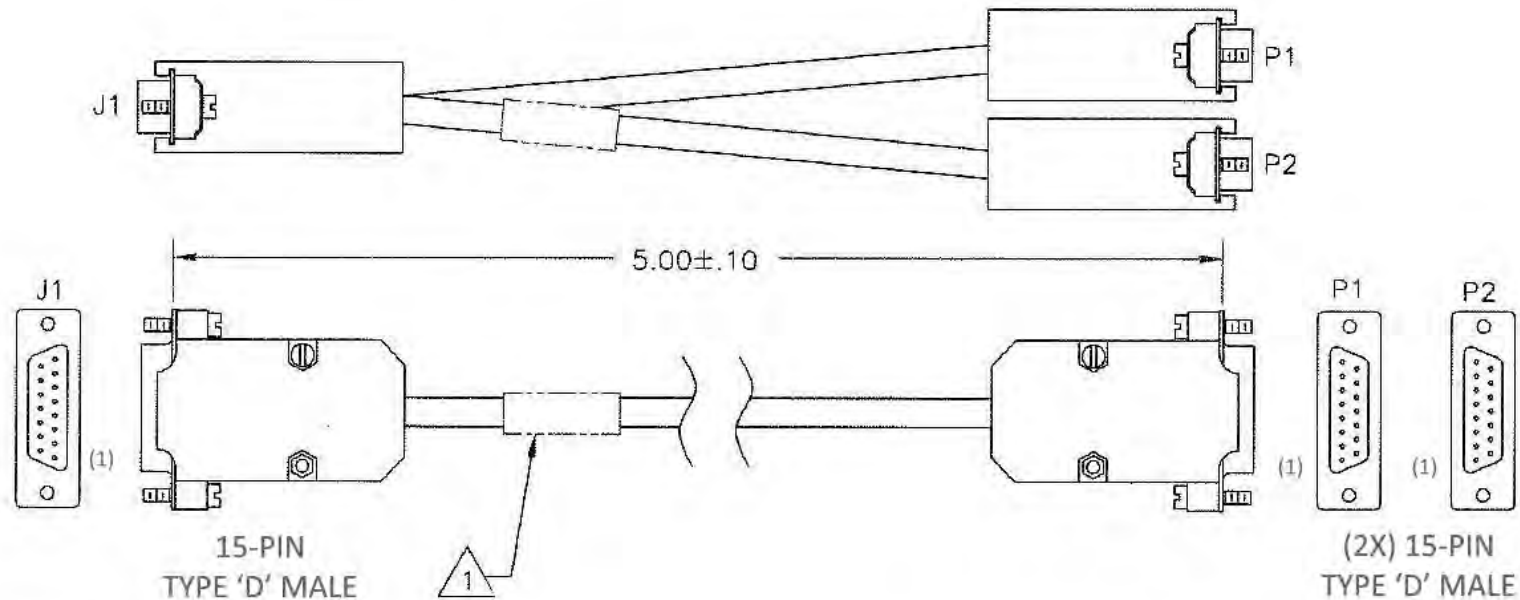


Figure A-16. Optical Gigabit Ethernet User Data Cable Assembly (See Table for CEFD Part No.)

A.3.11 Modem-to-User, G.703 Balanced User Data 'Y' Splitter Cable (DB-15M→(2X) DB-15M)



NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.
2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURER'S INSTALLATION PROCEDURE.
3. ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK OVER EACH SOLDER JOINT.
4. FOLD BACK FOIL, BRAID AND DRAIN FROM CABLE OVER GROMMET AND SEAL WITH COPPER TAPE

WIRE LIST				
FROM	TO	TO	SIGNAL	PAIR
J1-3	P1-3	P2-3	OUT+	X
J1-11	P1-11	P2-11	OUT-	
J1-1	P1-1	P2-1	IN+	X
J1-9	P1-9	P2-9	IN-	

Figure A-17. G.703 Balanced User Data 'Y' Splitter Cable (CA/WR10522-1)

A.3.12 Modem-to-User, HSSI User Data 'Y' Splitter Cable (HD-50M→(2X) HD-50F)

FROM	TO	SIGNAL	COLOR	PAIR
		GND	DRAIN	
P1-1	P1-1	P2-1	BLK	X
P1-26	P1-26	P2-26	RED	
P1-2	P1-2	P2-2	BLK	X
P1-27	P1-27	P2-27	WHT	
P1-3	P1-3	P2-3	BLK	X
P1-28	P1-28	P2-28	GRN	
P1-4	P1-4	P2-4	BLK	X
P1-29	P1-29	P2-29	BLU	
P1-5	P1-5	P2-5	BLK	X
P1-30	P1-30	P2-30	YEL	
P1-6	P1-6	P2-6	BLK	X
P1-31	P1-31	P2-31	BRN	
P1-7	P1-7	P2-7	BLK	X
P1-32	P1-32	P2-32	ORG	
P1-8	P1-8	P2-8	RED	X
P1-33	P1-33	P2-33	WHT	
P1-9	P1-9	P2-9	RFD	X
P1-34	P1-34	P2-34	GRN	
P1-10	P1-10	P2-10	RED	X
P1-35	P1-35	P2-35	BLU	
P1-11	P1-11	P2-11	RED	X
P1-36	P1-36	P2-36	YEL	
P1-12	P1-12	P2-12	RED	X
P1-37	P1-37	P2-37	BRN	
P1-13	P1-13	P2-13	RED	X
P1-38	P1-38	P2-38	ORG	
P1-14	P1-14	P2-14	GRN	X
P1-39	P1-39	P2-39	WHT	
P1-15	P1-15	P2-15	GRN	X
P1-40	P1-40	P2-40	BLU	
P1-16	P1-16	P2-16	GRN	X
P1-41	P1-41	P2-41	YEL	
P1-17	P1-17	P2-17	GRN	X
P1-42	P1-42	P2-42	BRN	
P1-18	P1-18	P2-18	GRN	X
P1-43	P1-43	P2-43	ORG	
P1-19	P1-19	P2-19	WHT	X
P1-44	P1-44	P2-44	BLU	
P1-20	P1-20	P2-20	WHT	X
P1-45	P1-45	P2-45	YEL	
P1-21	P1-21	P2-21	WHT	X
P1-46	P1-46	P2-46	BRN	
P1-22	P1-22	P2-22	WHT	X
P1-47	P1-47	P2-47	ORG	
P1-23	P1-23	P2-23	BLU	X
P1-48	P1-48	P2-48	YEL	
P1-24	P1-24	P2-24	BLU	X
P1-49	P1-49	P2-49	BRN	
P1-25	P1-25	P2-25	BLU	X
P1-50	P1-50	P2-50	ORG	

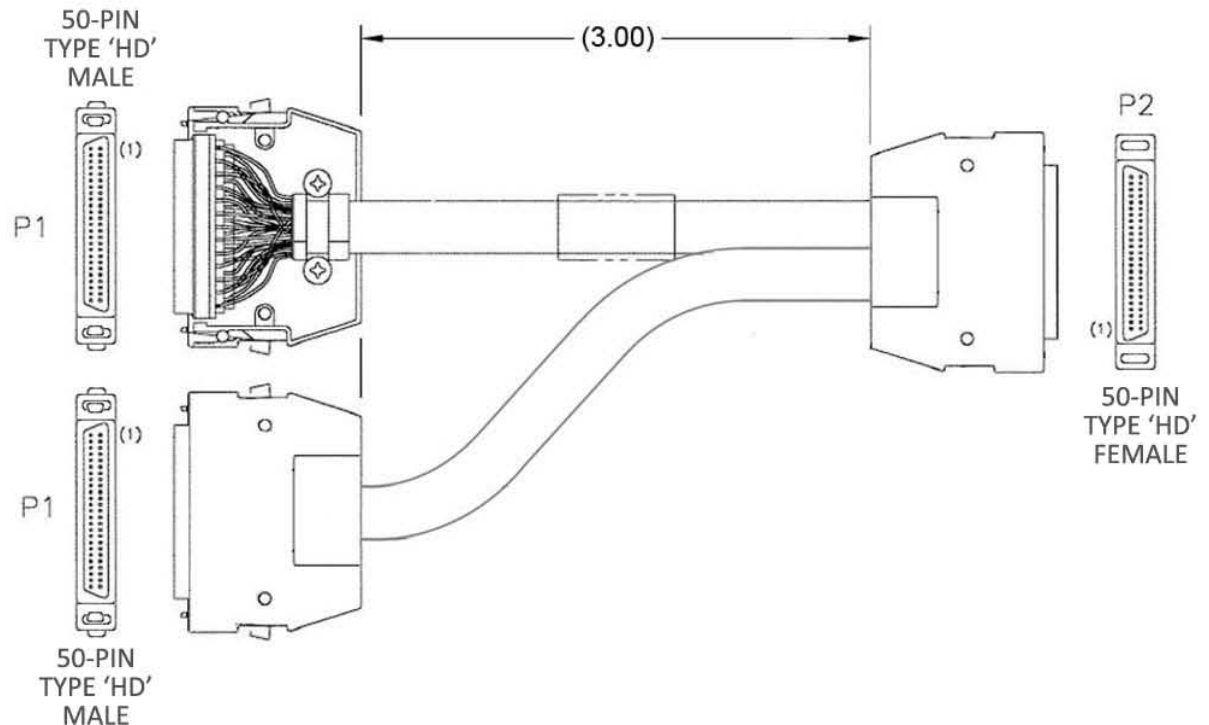
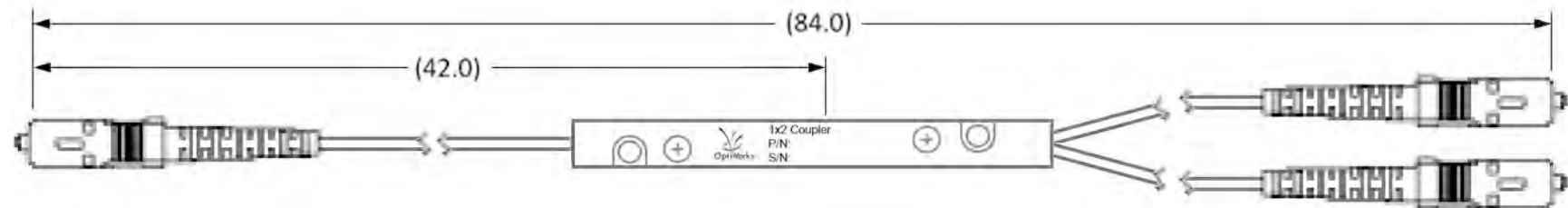


Figure A-18. HSSI User Data 'Y' Splitter Cable (PP/SC3523)

A.3.13 Modem-to-User, RoHS OC-3 Cable Assemblies, Single-Mode OR Multi-Mode (Type 'SC/UPC'→(2X) Type 'SC/UPC')



CEFD PART NO.	Description	Comments
PP/CPS2A12501	Single-Mode 'Y' Cable Assy – RoHS-Compliant, Optical Coupler, 7', Type 'SC/UPC' Connectors	For CDM-700 Single-Mode OC-3 Interface; Cables are YELLOW
PP/CPM6A1250	Multi-Mode 'Y' Cable Assy – RoHS-Compliant, Optical Coupler, 7', Type 'SC/UPC' Connectors	For CDM-700 Multi-Mode OC-3 Interface; Cables are ORANGE

Figure A-19. OC-3 User Data Cable Assembly (See Table for CEFD Part No.)



2114 WEST 7TH STREET TEMPE ARIZONA 85281 USA
480 • 333 • 2200 PHONE
480 • 333 • 2161 FAX